

CIVIL PREPAREDNESS AND LIMITED NUCLEAR WAR

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HEARING ON CIVIL PREPAREDNESS AND LIMITED NUCLEAR WAR

WEDNESDAY APRIL 28, 1976

U.S. SENATE AND
U.S. HOUSE OF REPRESENTATIVES,
JOINT COMMITTEE ON DEFENSE PRODUCTION,
Washington, D.C.

The committee met at 10:05 a.m. in room 5302, Dirksen Senate Office Building. Hon. William Proxmire, vice chairman of the subcommittee, presiding.

Present: Senators William Proxmire and John Sparkman.

Senator PROXMIRE. The committee will come to order.

Today's hearing inaugurates a review by the Joint Committee on our Nation's civil preparedness. It is the first such congressional review in over two decades.

By civil preparedness, we mean those mainly civilian measures by which we seek to protect the lives and property of our citizens.

This is the first function of any government. A government which cannot meet this fundamental test of defending its people and the national treasure is not likely to survive for very long.

In subsequent hearings, the committee will examine the adequacy of Federal, State, and local preparedness programs, including plans for fallout shelters, strategic evacuation, preparedness exercises and drills, civil defense stockpiles, and continuity of government. Likewise, the Joint Committee will inquire into the organization of the Government for preparedness. It will also review the Nation's industrial and economic preparedness in terms of the defense industrial base.

This is an especially timely undertaking. Over the past 2 years the United States has been moving from a declared nuclear policy of mutual assured destruction to one of flexible response, or limited nuclear war.

In the minds of some eminent strategists, this implies a lowering of the nuclear weapons threshold, a quickening of the trigger finger on the missile launch console, and an increased probability of uncontrolled nuclear conflict.

But to other equally qualified experts, this shift in strategic doctrine, this shift to larger numbers of more flexible, or more versatile and accurate weapons and control systems does not undermine deterrence of nuclear war; instead, it enhances deterrence.

Well, it can't be both ways and whenever you have such a complete divergence in expert opinion, it is time for a careful review of the facts.

Whichever view is ultimately adopted, this important alteration in our strategic doctrine suggests the need to take a hard look at our

capacity to survive a nuclear war. By survival I mean the perpetuation of our values, our society, and our institutions—not merely the maintenance of a bloody, radioactive remnant of a great nation, directed from command posts buried deep in the bowels of the Earth.

These hearings are also timely in that there are increasing rumors of a civil defense gap, with the Soviet Union well in the lead.

In this year's annual report, Defense Secretary Rumsfeld stated that, and I quote:

An asymmetry has developed over the years that bears directly on our strategic relationship with the Soviets and on the credibility of our deterrent posture. For a number of years, the Soviets have devoted considerable resources to their civil defense effort which emphasizes the extensive evacuation of urban populations prior to the outbreak of hostilities, the construction of shelters in outlying areas, and compulsory training in civil defense for well over half the Soviet population. The importance the Soviets attach to this program at present is indicated not only by the resources they have been willing to incur in its support, but also by the appointment of a deputy minister of defense to head this effort.

Now, the term "asymmetry" used by the Secretary sounds to a non-expert like me like a four-bit word for "gap." We have heard a great deal over the years about gaps that never materialized or proved unimportant. Yet we have spent a lot of money to eliminate the non-existent or the insignificant. It is for this reason that the committee last week published the declassified text of the 1957 Gaither Report which invented the first missile gap.

Now, it is well known that the Soviet Union has mounted a substantial civil defense effort ever since World War II. The Joint Committee is concerned to know why this fact suddenly seems so significant. Have the Soviets augmented their already costly efforts? If so, why? And if the bomb shelter gap is significant, why was it allowed to occur? Or is it that the Russian civil defense program has only become worrisome in the context of the new American doctrine of controlled nuclear war? Does this longstanding Soviet interest in civil defense stem from a Russian willingness to wage nuclear war or from a fear that American nuclear strength makes such war unavoidable?

These are but a few of the questions to which the committee seeks answers.

We are also interested in knowing why—if the Soviets have a civil defense lead—why has the administration recommended cutting our own civil defense budget by, in effect, about 25 percent.

Moreover there is increasing evidence that our industrial base may have seriously deteriorated in recent years in some respects. While we have excess capacity among prime contractors, defense subcontractor and supplier capacity is dwindling. Defense planners tell us that we may not have the necessary surge capacity to meet unforeseen contingencies.

The lesson to be learned is that our preparedness programs, our pre-mobilization efforts are doing only half the job.

That is, they can stimulate creation of productive capacity, but they cannot preserve it. The missing component in our programs may be conversion efforts that will permit the retention of usable productive capacity during peacetime.

The aim of today's hearing is to set the scene for later discussion of these and other matters. We are very fortunate in having the assist-

ance of four distinguished strategic thinkers to establish the context in which our preparedness planning should go forward.

Our guests are the Honorable Paul S. Nitze, former Secretary of the Navy, Deputy Secretary of Defense and member of the SALT delegation; Mr. Herman Kahn, director of the Hudson Institute and a prolific author on strategic matters; Dr. Wolfgang Panofsky, director of the Stanford Linear Accelerator Center and a longtime scientific adviser to the Government, and Dr. Richard Garwin, IBM fellow at the Thomas Watson Research Laboratory and also a consultant to the Government on military technology.

We have also asked 15 other eminent scientists and strategists to submit for the record their views on civil preparedness and limited nuclear war.

We have invited the gentlemen present today to give us the benefit of their thinking on the salient issues in connection with nuclear war preparedness. The committee needs to know what contingencies should drive our preparedness plans programs.

It needs to know what is necessary, what is prudent, what is possible and what is affordable in the way of civil preparedness.

It needs to know whether arms reductions offer a viable alternative to massive civil defense.

I do not expect that we will gain any final answers to these questions today, but our subsequent inquiries will certainly be far more informed by having had this wide-ranging discussion of nuclear war preparedness.

Now, if it is agreeable to our witnesses, and the members of the committee, I propose that each of our witnesses be allowed 10 minutes to summarize their written testimony, and the text of their statements will be printed in full in the record.

Following the summaries, the committee's guests will convene as a panel to take questions.

Mr. Nitze, if you will open our discussion, I will ask Mr. Kahn, Dr. Garwin, and Dr. Panofsky to follow in that order.

STATEMENT OF HON. PAUL NITZE, FORMER SECRETARY OF THE NAVY, DEPUTY SECRETARY OF DEFENSE, AND MEMBER OF THE SALT DELEGATION

Mr. Nitze. Mr. Chairman, my interest in the questions which this committee is discussing began in 1944 when I was asked to be a director of the U.S. Strategic Bombing Survey. The required qualification of the directors was that they have no prior knowledge of military strategy or of air power, and could thus be presumed to be unbiased in appraising the effects of the immense U.S. strategic air effort in World War II. I spent the next 2 years in Europe and then in the Pacific in intensive work, in association with what I believe to have been the best talent available to this country, to try to understand something about both subjects. In the Pacific portion of the survey, as Vice Chairman, I was in effective command of the operation, including the detailed study of the effects of the weapons used at Hiroshima and Nagasaki.

Since that time much has changed. Weapons have increased in yield and missiles now have an intercontinental range. But these changes

are hardly as revolutionary as the changes brought about by the role of effective air power in World War II and of the introduction of nuclear weapons in its closing phase. After all, the largest number of our nuclear reentry vehicles today are Poseidon warheads, each of which has an equivalent megatonnage less than twice that of the weapons used at Hiroshima and Nagasaki.

At Hiroshima and Nagasaki there was no air-raid warning and very few people availed themselves of the crude civil defense facilities which were available. Most of those that did, even at ground zero, in other words, directly under the explosion, which was at the optimum height of burst, survived. The trains were operating through Hiroshima 2 days after the explosion.

Let me quote from the findings of the Pacific survey:

The threat of immediate retaliation with a striking force of our own should deter any aggressor from attacking.

If we are not to be overwhelmed out of hand, in the event we are nevertheless attacked, we must reduce materially our vulnerability to such attack. The experience of both the Pacific and European wars emphasizes the extent to which civilian and other forms of passive defense can reduce a country's vulnerability to air attack. Civilian injuries and fatalities can be reduced, by presently known techniques, to one-twentieth or less of the casualties which would be suffered were these techniques not employed. This does not involve moving everything underground, but does involve a progressive evacuation, dispersal, warning, air-raid shelter, and post raid emergency assistance program, the foundations for which can only be laid in peacetime. The analysis of the effects of the atomic bombs at Hiroshima and Nagasaki indicates that the above statement is just as true and much more terrifyingly significant in an age of atomic bombs than it was in the age of conventional weapons. Similarly, economic vulnerability can be enormously decreased by a well worked out program of stockpiles, dispersal and special construction of particularly significant segments of industry. Such a program in the economic field can also be worked out satisfactorily only in peacetime.

Having read the exchange between Arthur Broyles and Eugene Wigner on one side and Sidney Drell on the other, in the April 1976 issue of *Physics Today*, I see nothing to make one believe that the physics of the problem have significantly changed. The question is primarily political and strategic.

For 30 years the political climate in the United States has not been such as to sustain the public backing required for an effective civil defense program. The public and the Congress have been far more favorably inclined to offensive systems than to defensive ones. I believe that is still the situation.

It is for that reason that I included the following paragraph in my January *Foreign Affairs* article:

As to the civil defense aspect, the absence of a U.S. capability to protect its own population gives the Soviet Union an asymmetrical possibility of holding the U.S. population as a hostage to deter retaliation following a Soviet attack on U.S. forces. Although the most economical and rapidly implementable approach to removing this one sided instability would be for the United States to pursue a more active civil defense program of its own, such a program does not appear to be politically possible at this time. Its future political acceptability will be a function of the emerging threat and its appreciation by U.S. leadership and by the public.

There is, however, a deeper strategic question involved. In the days when I was trying to educate myself in questions of strategy, I found the study of Clausewitz to be as rewarding as that of more modern students of the question.

Let me paraphrase from an interchange I had in 1960 with Colonel Lincoln, head of the faculty at West Point, on this subject:

Clausewitz exhibits a rather German point of view in the way his mind works and in the way he analyzes the problem of war. He divides his work into two parts: one deals with what he calls the pure theory of war, where everything else is excluded except the factors that emerge from war itself. He demonstrates that in such a pure theory of war, if you exclude everything else, there is a tendency for violence to generate violence; finally, the war tends to become more and more violent, up to the very limit of violence which the then state of technology permits.

In the second part, he points out very carefully that this is just the pure theory and that actual wars were not fought in this way. He says that actual war is the extension of policy with the admixture of other means. He shows that what pure theory would indicate to be the course of a war is modified by the fact that war is senseless unless its purpose is to accomplish a political objective, that political objectives arise from the decisions of policymakers, and these are controlled by the social situation which exists in each of the countries involved in the war.

He makes a distinction between a war for the purpose of effectively disarming the opponent and putting him in a position where he has to accept the other side's will, and the other form of war where one side is merely trying to defend a province or take a province or gain certain counters which he hopes will be useful in the eventual peace negotiations.

Clausewitz is careful to define the conditions under which his general statements are, or are not, applicable, and how the external political field must be related to the military field. He brings out the interaction between things, the reciprocal actions, how one side does bear upon the actions of the other side, and how that in turn affects what the first side does. The important interaction of the offense and the defense is very well handled by Clausewitz.

The Russians are careful students of Clausewitz. I do not believe they would ever ignore either the danger that a war once started might escalate to the full violence which the pure theory of war might indicate; on the other hand, they would never forget that war is a tool of policy and that every effort must be made to avoid letting it so escalate.¹

I believe they will always pay close attention to the interrelationship of the offense and the defense and not ignore either side of the equation. I cannot believe they would so ignore the military core of war as to consider the type of controlled nuclear conflict discussed in some of the papers circulated by the committee's staff where military targets are avoided and industrial targets are hit.

On the other hand, I can well imagine that they might consider a controlled nuclear conflict in which significant military targets, but

¹ In this connection the following quotation from *Communist of the Armed Forces* in November 1973 is pertinent: "The premise of Marxism-Leninism on war as a continuation of policy by military means remains true in an atmosphere of fundamental changes in military matters. The attempt of certain bourgeois ideologists to prove that nuclear missile weapons leave war outside the framework of policy and that nuclear war moves beyond the control of policy, ceases to be an instrument of policy and does not constitute its continuation is theoretically incorrect and politically reactionary."

not urban-industrial targets are the initial objects of attack, if they thought war unavoidable.

In conclusion, I would like to comment on this committee's print containing the Gaither Report of 1957.

I have now read that report for the first time in nearly 20 years. I am impressed—especially in light of the information then available to the Gaither committee—by the care and comprehensiveness of that committee's examination of the problems assigned to it for study. I note in contrast the cavalier imprecision reflected in the foreword prepared by this committee's staff.

It is not true that the Gaither Report ignored arms control, nor is it true that the report spoke of U.S. strategic inferiority as then a fact. To the contrary, the Gaither Report described the United States as then "capable of making a decisive attack on the U.S.S.R." In view of SAC's vulnerability "to a surprise attack in a period of lessened world tension," the Gaither Report also noted the U.S.S.R.'s capability to make "a very destructive attack on this country."

The report then observed, "As soon as SAC acquires an effective 'alert' status, the United States will be able to carry out a decisive attack even if surprised," and it anticipated that juncture "as the best time to negotiate from strength, since the U.S. military position vis-à-vis Russia might never be so strong again."

In attempting to disparage the Gaither committee's analysis, the staff foreword cites a subsequent estimate " * * * that at the time of the Gaither Report the Soviet Union probably had fewer than a dozen operational ICBMs." In fact, at the time of the Gaither Report—only a few weeks after the sputnik launching—the Soviet Union obviously had no operational ICBMs. The Gaither Report made no assumption to the contrary. Indeed, it postulated 1959 as the probable year the Soviet Union would first have operational ICBMs; in fact, they first became operational in 1960. What was crucial at the time was not only the question of how many ICBMs would be operational when, but even more importantly the question of the speed with which the U.S. Air Force could achieve adequate early warning facilities and an appropriate alert posture.

The Gaither Report focused attention on those questions. Thereby the report became a factor in stimulating an enormous effort on the part of the United States to move ahead with pertinent strategic programs. In those years the rate of expenditure on strategic programs was, allowing for inflation, about 2½ times the present rate.

For all the great expense, the program was a bargain when considered against the calamitous potential consequences of permitting the strategic relationship to become unstable to the detriment of U.S. security and with increased risk to the maintenance of peace.

The report placed first priority on the military measures necessary to maintain strategic stability and high quality deterrence. It placed a lower priority on those measures necessary to ensure survivability of the population in event deterrence were to fail. The two classes of measures are, however, interrelated.

Senator PROXMIER. Thank you, Mr. Nitze.

[Complete statement follows:]

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SUMMARY STATEMENT BY THE HONORABLE PAUL H. NITZE

Mr. Chairman: My interest in the questions which this Committee is discussing began in 1944 when I was asked to be a director of the U.S. Strategic Bombing Survey. The required qualification of the directors was that they have no prior knowledge of military strategy or of air power, and could thus be presumed to be unbiased in appraising the effects of the immense U.S. strategic air effort in World War II. I spent the next two years in Europe and then in the Pacific in intensive work, in association with what I believe to have been the best talent available to this country, to try to understand something about both subjects. In the Pacific portion of the Survey, as Vice Chairman I was in effective command of the operation, including the detailed study of the effects of the weapons used at Hiroshima and Nagasaki.

Since that time much has changed. Weapons have increased in yield and missiles now have an intercontinental range. But these changes are hardly as revolutionary as the changes brought about by the role of effective air power in World War II and of the introduction of nuclear weapons in its closing phase. After all, the largest number of our nuclear reentry vehicles today are Poseidon warheads, each of which has an equivalent megatonnage less than twice that of the weapons used at Hiroshima and Nagasaki.

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The Golder Report focused attention on those questions. Thereby the Report became a factor in stimulating an enormous effort on the part of the U.S. to move ahead with pertinent strategic programs. In those years the rate of expenditure on strategic programs was, allowing for inflation, about two and a half times the present rate. For all the great expense, the program was a bargain when considered against the calamitous potential consequences of permitting the strategic relationship to become unstable to the detriment of U.S. security and with increased risk to the maintenance of peace.

The Report placed first priority on the military measures necessary to maintain strategic stability and high quality deterrence. It placed a lower priority on those measures necessary to ensure survivability of the population in event deterrence were to fail. The two classes of measures are, however, interrelated.

STATEMENT OF HERMAN KAHN, DIRECTOR, HUDSON INSTITUTE

Senator PROXMIER. Mr. Kahn.

Mr. KAHN. It is customary to start one's testimony with a statement of qualifications. Let me instead start with a disqualification.

I haven't really been spending very much time in the military field since 1965, but I started to go back last year, and I am now in the middle of reacquainting myself with the issues.

I might say though that comparing today's discussion to the sixties, there has been very little substantial improvement. In fact there have been some retrogressions. This both disturbs and surprises me.

Let me start by agreeing with Paul on two issues. The chairman just stated we can't have both increased and decreased deterrence. I believe that there are many measures which can go in both directions.

There are many measures which increase deterrence in one scenario or context, and decrease deterrence in another scenario or context. In particular, if one focuses on this abstract war, what Paul referred to as a pure military war, or a surprise attack out of the blue directed against civilians, then it is terribly easy to do many things which will decrease that deterrence.

But since I tend to feel we have, relatively speaking, too much deterrence in this situation I do not object to decreasing the deterrence of surprise attack out of the blue in favor of increasing deterrence in other situations. In fact there has been much too much attention to this simple situation. I know back in 1960, a number of polls were taken by Tom Schelling, by Weapon Systems Evaluation Group (WSEG) and others. In these polls analysts were asked "If a war occurred, what scenario do you think would have preceded the war?"

Almost universally, they agreed there would have been a very tense situation, say bombs bursting in Europe, and then either an attack by the Soviets because they got into serious trouble, an accidental war, or an attack by the U.S. All the analysts agreed that a surprise attack out of the blue, directed at cities, was far and away the least probable way that a war was likely to start.

And yet they all also agreed that 90 percent of their personal studies and effort went to that case and the other 10 percent or so went into a study of a surprise attack out of the blue which hit military bases. In other words, the analysts agreed, that even though they were able

to choose their own subjects of study, they were spending almost all of their time on scenarios which, in their judgment, were not probable or important. They simply were the easiest things to study and talk about.

[Additional remarks:]

Many analysts are still doing this, but do not seem to know that this emphasis distorts the realistic priorities.

Now, when we looked at civil defense in 1960—or today—it was really almost impossible to protect the population against a surprise attack directed against them. We found that it was also impossible to protect an economic base for massive war production against a surprise attack directed against the economic base.

Therefore, we did not ask ourselves, as a high priority, what does civil defense do for these objectives in these scenarios.

However we did not stop there. We went on to ask ourselves if there were any other roles for civil defense.

It seemed to us that there were a large number of roles. All of them tended to be second or third priority but still terribly important. When people said, "But that doesn't do any good in the first priority situation," we answered, "We don't care."

The first, perhaps the most important role, is to protect people when they are not targets. I am prepared to believe that doing this decreases deterrence, but I am willing to do it anyway.

I know when I examine the problem of attacking the Soviet Union that I want to preserve Moscow and Leningrad, my two biggest assets, and anything they do to make Moscow and Leningrad safe from becoming bonus targets improves my ability to plan war against the Soviets. Moscow and Leningrad are important to the Soviets and they are probably willing to do that. Deterrence is not the sole objective of policy.

In a book called *On Thermonuclear War* which I published in 1960, we mentioned what we called the Doomsday Machine was the highest possible deterrent, yet nobody wanted it. I might also mention that I made clear, in that book, that we didn't think there was any missile gap. In fact, just to go back over a little history of that, most people's recollection of the debate of that period tends to be wrong.

It is not true that the Democrats raised the issue of a missile gap against the Republican administration. That was a Republican statement. The Republicans predicted the Russians would have 300 missiles by 1960. But at the same time, the Republican administration said this wouldn't make any difference, because we had 2,000 bombers and they were more important than 300 missiles.

The great contribution of the Gaither Report, as Paul just said, was to make clear that if the Soviets had 300 missiles and we did not have any kind of warning system, then we might not have 2,000 bombers, because they could be destroyed by a surprise attack while still on the ground.

I also made clear, that while the Soviets probably would not have 300 operational missiles in 1960, if they did have them, we would be in trouble—that is, despite the predictions by the Republican administration we did not think they had such a force—but we were not sure.

What does one do when the other side may be able to do something in the near future and if one waits until he is certain before reacting, it is too late, while if one reacts early it may turn out to have been unnecessary?

Let me also make a remark about a release I saw from this committee which listed a series of predicted gaps which did not occur. In at least half the cases, people were rather clear that the gap might not occur, but they were not sure.

[Additional remarks:]

But they felt they had to worry about it ahead of time and even make some preparations because they could not afford to wait until all the facts were in.

Let me ask a question: What do you do if the other side exhibits a weapon system and has the production capability? You are not quite sure what he is going to do. Do you wait until he does it or do you worry about it?

In general this is a very complicated issue. In some cases, we almost have to make preparations ahead of time, even though they may be wasted. In other cases, we should wait until we are more sure; in still other cases, one just hopes for luck. But one should not, in my judgment, downgrade responsible officials who get concerned under such circumstances.

I might also draw attention to some studies done by Albert Wohlstetter. It is pointed out in these studies that in most cases, we have underestimated rather than overestimated U.S.S.R. future capability. I will ask that this report be sent to the committee.

If you look at the record, there has been more a problem of underestimation than overestimation. This is true in terms of the number of missiles the Soviets have had over time and in terms of Soviet capability on all kinds of other issues. We tend to remember the discussion when some hysterical people overstate the problem; then it turns out to be wrong. I would argue this is not at all the characteristic problem.

Let me turn to the major point I wanted to make today. I would argue that the scenario I worry about as the most probable scenario, is also the scenario which is least discussed. This is the case where there is opportunity for significant or even all out mobilization before major thermonuclear attacks against the cities occur.

There are two recent and useful historical examples which illustrate this concept, the Korean War and World War II.

In June 1950, Congress was debating whether the budget should be \$15, \$16 or \$17 billion. The previous year it had been \$13 billion. A number of distinguished witnesses testified that \$15 billion would strain the economy, but \$16 billion was all right. North Korea marched on South Korea, and within 1 year, Congress authorized \$60 billion, an increase by a factor of 4.

This was totally unexpected and totally changed the strategic problem. One should note that it would not have been possible to fit into even an \$18 billion budget hardly any of the weapons systems we have procured since World War II. One could not have bought a Sage system, a B-47 system, a B-52 system, a Nike Hercules system, a Polaris system, and so on. None of these systems would have been feasible at the \$5 or \$6 billion budgets per service which were, roughly, current at that time.

As a result of this authorization, the Air Force budget was increased by about a factor of 5. The other two services had an increase of about 3. As a result, a whole new range of possibilities opened up for the services.

I can easily envisage a scenario for crisis in the future which involves military budgets of \$500 billion or more. That would change, if you will, the whole character of strategic planning. I do not expect any such situations to arise with high probability, but I do not consider it paranoiac or unwise to prepare for such situations.

Probably an even better prototype for the situation we are thinking about is post World War II. After World War I, much of the world became sick of war, and war became "unthinkable" to most people, particularly in the victorious "Allied Powers." Strategists and publicists talked about poison gas and knock-out blows, they thought all the capital cities would be destroyed by poison gas in the first few days of a war. They did not understand the idea of limitations in warfare—of mutual deference even after hostilities have broken out.

When Hitler got elected in 1933, people became interested in larger defense budgets. Then he marched into the Rhineland and, of course, defense budgets increased slightly. Then there was the Anschluss and then Munich, and more substantial increases in military budgets. With the invasion of Czechoslovakia, everybody got deeply concerned. Then, finally, there was the invasion of Poland, the formal declaration of war and then 7 months of more or less "phony war." As a result there was opportunity on both sides for 7 months of full time war production, before the war really opened up.

We would argue that similar possibilities should be considered today. Nobody is interested in jumping into a nuclear war today. Nobody is going to want to execute the usual picture of nuclear war, in which each side presses every button and goes home. It is extraordinarily difficult to believe such a scenario.

It might happen. But I would be willing to bet, if this were a betting matter, 2 to 1 against it.

On the other hand, the situation might arise in which there was a declaration of war, followed by a phony war, or a serious confrontation in which there were credible threats of war. By the way, in such a confrontation, the following dialog tends to occur.

Both sides are saying to the other side, "There is absolutely nothing at risk which justifies this terrible danger to which we are subjecting each other and the rest of the world. It is clear that whatever we are arguing about is simply not worth the risk of a thermonuclear war. Therefore, one of us has to be reasonable and it isn't going to be me."

That is, by the way, a terribly persuasive argument.

At this point, each side is trying to explain why the other side should be reasonable. You don't have to have a great defense to do that. All you have to be able to do is say, "I believe my defense establishment is better than yours, in important ways."

I can imagine the Russians telling us, "You are telling us the money we spent on our defense establishment does us no good, but we spent it because we thought it does do good. We believe that this defense establishment of ours works. You don't, but we believe it does."

If you can get that point across, you are going to put great pressure on the other side to back down.

Senator PROXMIRE. Very strong chance of what? I missed that.

Mr. KAHN. If we believe that they believe they have confidence in their establishment, we are going to back down, whether or not their

confidence is justified, because we would be destroyed almost as much as a result of their mistaken belief as by a correct one. If the other man can give you a credible picture, that he believes he has a serious edge over you, then even if he does not objectively have that edge, you may be in trouble.

That is even more true for allies. If they think the other side believes it has an edge, the allies are going to hedge. Finally it is even more true for neutrals that in a bargaining situation the strategic balance is very complex (which should be an obvious point) and the outsider is likely to be excessively influenced by appearances. Who strikes first and how many are dead in each city are almost irrelevant to many of these issues.

Finally, a last point. When we write scenarios for nuclear war, we find it difficult to write a credible scenario which doesn't involve months or weeks of warning. I would guess we are as good at writing scenarios as anybody in the world. We have certainly written as many.

I want to warn the committee, on the other hand, that when we looked at World War I, we didn't find that scenario plausible. The mere fact we can't write a plausible scenario for a war doesn't mean it can't occur, because one can find historical examples to the contrary.

Nevertheless, every scenario we write for nuclear war involves days, weeks or months of tension. Evacuation, last moment mobilizations are extraordinarily possible. By the way, evacuations occur not as a result of secret intelligence or in any attempt to try to outrun the missiles or the bombers. The *New York Times* and the *Washington Post* provide the warning perhaps days before the attack. People or governments then get frightened and decide to decrease their vulnerability to attack. The idea is, can you exploit such warning if it is printed in the papers?

[Complete statement follows:]

SUMMARY PAPER AND BRIEFING NOTES ON THE POTENTIAL OF THE DEFENSE MOBILIZATION BASE CONCEPT BY HERMAN KAHN, WILLIAM BROWN, AND WILLIAM SCHNEIDER, JR.

This submission is the responsibility of the authors and is not to be construed as representing any official opinions of the Hudson Institute or any other associated individuals or agencies.

PREFATORY NOTE

The following paper represents a summary of studies developed by the staff and consultants of the Hudson Institute more or less continuously over the last fifteen years although naturally it focuses more intensively upon recent work. In particular, a summary of a report on the concept of mobilization warfare by Herman Kahn and William Schneider, Jr. Most of Hudson's program of civil defense and mobilization base studies has been accomplished under the direction of William Brown, Herman Kahn and William Schneider, Jr. and at least half the Institute's personnel have participated in one or more of them. This particular submission was prepared as a joint paper by the three people named above.

MOBILIZATION WARFARE

1. The concept of mobilization warfare

The notion of mobilization in a nuclear age has the appearance of a contradiction in terms when arrayed against the conventional concept of mobilization. Mobilization has in general, been associated with the redirection of national resources, both human and material away from traditional civilian pursuits to support a defense effort. To some extent, it has been possible to conceive of a limited mobilization of military forces and associated national resources to support

Isolated political objectives although the more traditional perception has been associated with a general mobilization of the entire industrial might and armed forces of a nation.

The possibility of intercontinental strategic nuclear attack made possible through the development of ICBM's, missile firing submarines, and long-range bombers have made the initiation and conclusion of a nuclear conflict appear to be a matter of hours or days, and certainly not more than a few weeks in duration, making the traditional notion of mobilization appear to be as archaic and obsolete as the forces and weapons that had been in the past, mobilized.

This study is intended to advance the concept that mobilization is an important component of strategic nuclear conflict, and, we will argue, is likely to be the prototype of any U.S.-Soviet nuclear conflict should such a conflict occur. The concept can be most simply characterized from the perspective of the following simple generalized scenario: During a period of intense political crisis between the U.S. and the Soviet Union, both sides fear that a nuclear war may actually occur. However, neither side is willing to risk the consequences of a nuclear war with the existing levels of forces and defenses (military and civilian). As a consequence, each of the parties attempts to develop on a frantic basis a very large-scale effective nuclear offense and defense capability which is associated with genuine fears about the possibility of a general war. The period of mobilization during and after an intense political crisis characterizes what we describe as "mobilization warfare." It is warfare in the sense of an intense and bitter competition of an accelerated arms race, but without the certainty that direct military action will occur. A plausible outcome of this scenario is that the side which mobilizes most effectively within a relatively brief period of time (say six months to two years) can achieve a dominant position capable of inhibiting the diplomatic efforts of the other.

The notion of "mobilization warfare" is not restricted only to strategic nuclear warfare. It is also applicable, for example, to a U.S.-Soviet struggle in Europe in which an intense political crisis raises the specter of an outbreak of conventional warfare between the two nations without the expectation that such a conflict would lead to a strategic or tactical nuclear exchange.

Perhaps the closest parallel to mobilization warfare during the nuclear era arose as a consequence of the Korean war. The ominous character of Soviet foreign policy following World War II culminated in the Soviet sponsored attack of North Korean forces against the Republic of Korea. The direction in Soviet foreign policy after World War II was not offset by any rebuilding of U.S. military power which had been rapidly dismantled after the end of World War II. However, when the Soviets authorized the attack on Korea, the change in U.S. attitudes regarding preparedness for a U.S.-Soviet strategic nuclear contingency was electric. One measure of the character of this concern, a measure characteristic of a serious mobilization, was the decision of the Congress to increase annual defense expenditures from \$10 to the \$60 billion authorized after the outbreak of the Korean war. This vast increase in authorized expenditures made possible a set of strategic programs that were simply not feasible within the prior U.S. defense budget. The new authorization made possible the B-72, the B-47, the Polaris Program, and Atlas Program and a host of related technological initiatives whose consequences are still influencing the shape of the U.S. strategic program today. It also developed a reasonable (for the time) civil defense program designed to move the more vulnerable portions of the home population rapidly to safer areas. As a consequence of this enormous build-up of strategic nuclear capability arising out of the concern over a possible U.S.-Soviet nuclear conflict in the early 1950s, the United States achieved for more than a decade a stark nuclear superiority over the Soviets. This superiority was so vast that in retrospect it appears clear that the Soviets were almost totally deterred from attempts to exert military power in support of their diplomatic objectives throughout the late 1950s and early 1960s.

In the early 1950s the Soviets also attempted to develop a larger strategic program, but were much less successful than the United States. This form of mobilization warfare, we argue, is more likely to become a "standard" mode of nuclear conflict with the Soviet Union than the commonly anticipated mode, namely a direct exchange of nuclear weapons.

Perhaps the most significant difference between traditional mobilization concepts and the concept of "mobilization warfare" that is the focus of this paper is that in a modern mobilization the adequacy of a period of mobilization may be "tested" only in the sense that it can affect the perceptions of an opponent without

a shot being exchanged. Moreover, the process of mobilization in the modern era might be considerably more compressed and complicated than any which we have experienced in this century. In a very practical sense, the mobilization of Germany and the allied powers before the first World War was a traditional process which extended over a period of many years, although the most intense efforts took place after the initiation of the conflict. Similarly, the German and Japanese pre-war mobilization of their forces occurred over many years. In both cases, a large-scale and protracted conflict followed. Under modern conditions, a nuclear conflict between major powers is likely to be short compared to previous conflicts or to any period of mobilization.

The concept of mobilization warfare in a nuclear era implies relatively short reaction times with the ability to deploy major offensive as well as active and passive defensive systems which may be extremely costly and complex by any prior standards. Under such circumstances, it is entirely plausible that the U.S. strategic budget alone could constitute an expenditure of several hundreds of billions of dollars per year. Expenditures at such huge levels make possible a very wide range of military and non-military defense systems that could not be seriously considered with recent strategic budgets—less than \$10 billion.

For example, potentially high grade missile defense systems employing lasers, particle beam technology and other advanced concepts for boost phase, mid-course, and terminal interception could, in principle, be procured under conditions of "mobilization warfare." The crucial determinants for acquiring such a capability lies in the prior research and development program and in proper institutional orientation toward a mobilization potential. The requirements of a "mobilization base" to support the notion of mobilization warfare is sufficiently different from the objectives of existing research and development needed to support current and near term defense requirements that expenditures for a mobilization base should be partitioned from other R&D expenditures. The primary function of a mobilization base is to facilitate the shortening of lead times to procure highly effective strategic forces, active defenses, and civilian protection, should a decision to procure such a capability be made in a context that requires such a build-up be completed in an extraordinarily short period of time (short, that is, by the standards of recent experience). Under some circumstances, it is sufficient simply to have "paper plans" say, for the conversion of designated industrial potential from civilian to military uses. In other cases, where the requirements are more critical, and less easily adaptable to short-term changes, some limited development or prototyping may be necessary. In still other cases, particularly where the function is highly complex and likely to involve large numbers of both civilian and military personnel, such as an ABM or civil defense system, it may be necessary to conduct a limited deployment or field testing, and to develop the professional cadres who could support a vast expansion if and when circumstances require such expansion. The decision as to what elements of a potential U.S. strategic posture should be most extensively or rapidly developed would depend upon the contribution such efforts would make to reducing the lead times necessary to deploy the capability during a period of intense mobilization. The United States already possesses a substantial infrastructure for the rapid short-term expansion of U.S. strategic forces. With relatively modest expenditures, it should be possible to dramatically improve the ability of the United States to mobilize rapidly during an appropriate crisis to increase strategic nuclear forces, its active and passive defenses, and its general purpose forces without the protracted lead times that we have tended to become accustomed to over the past two decades.

2. A baseline mobilization warfare scenario

The high probability of a U.S.-Soviet strategic nuclear exchange in recent political-military circumstances has tended to obscure the fact that there are numerous possibilities for a major clash of interests between the superpowers, and consequently, for escalation.

The scenario proposed here arises out of the Achilles' heel of the Soviet Union, the behavior of their East European satellites, in this case, East Germany. Internal dissension develops beyond the control of the local and Soviet political and military leadership in East Germany to the point where large scale border crossing into West Germany by deserting elements of East German armed forces involves the NATO nations. Unlike the standard escalation scenario where such events lead ultimately to a U.S.-Soviet nuclear exchange, the potential escalation, itself, becomes a force for restraint.

Both sides, fearing the consequences of uncontrolled escalation seek to head off such an eventuality. The reciprocal fear of the (now) real possibility of actual nuclear conflict is the mechanism which leads both parties to seek to develop large-scale nuclear offense and defense capabilities rapidly. This is initiated by a desire to have sufficient offensive as well as less vulnerable forces in time for the next political crisis in order to be able to control the outcome. This situation is a nuclear analog of the "phony war" period in 1940.

One need not confine such discussion to the possibility of nuclear confrontation: depending upon the circumstances, one can plausibly imagine a Naval arms race or a build-up of general purpose forces in a variety of contingencies. The essential point is that the standard mode of superpower conflict is likely to involve a cycle of political crises—limited confrontation—mobilization—political crisis—settlement or full-scale confrontation where the mobilization phase is the critical element in determining the outcome.

3. Soviet mobilization practice

As in many dimensions of their military effort, Soviet mobilization behavior varies noticeably from the Western model.

Present day mobilization may take one of the following forms:

1. Total or Special
2. Open or Concealed

Total mobilization refers to mobilization in the event of general war which would involve all arms and services, auxiliary facilities, and civilian protection.

Special mobilization can involve only certain military districts in the vicinity of the theater of operations as for example the 20 divisions of the Group of Soviet Forces in Germany (GSFG) in the event of a crisis or conflict in Central Europe while would involve Austria or Czechoslovakia or the mobilization of the 35 divisions in the Turkish Military District for possible involvement in the event of a conflict between Iran and Iraq. Although special mobilization would first be done on a territorial basis it is assumed that at a later stage both weapons and troops would be shifted from other areas.

Open mobilization could take place in a crisis for either deterrent or interventionist purposes. For deterrent purposes open mobilization would be done with maximum publicity and would include forces for demonstrative missions, a possible show of strength in the area of immediate conflict or a diversionary action in another geographical region with the express aim of diffusing the conflict and distracting the adversary. The entire mobilization machinery would be involved, from military and support units and the display of the most modern types of weapons to Soviet media and public opinion and fellow travelers in other countries. The Cuban missile crisis is the most recent example of open mobilization involving the Soviet Union.

Concealed mobilization could take place in the event of a pre-planned surprise attack against another country, in case of an invasion of an East European or Asian communist state or in response to an international crisis in which the Soviet Union would desire to intervene in support of a client state, prevent another superpower from intervening or exercise leverage during the crisis by the mere threat of intervention or action elsewhere. Concealed mobilization involves the mobilization of certain units under the guise of different types of maneuvers (e.g., "Nemitsa" in Czechoslovakia in 1968) which allows the Soviet High Command to bring troops and weapons into a state of combat readiness.

It is important to note that each service has its own special features and thus requires a different degree and type of mobilization. The Soviet paratroop divisions, as the most mobile force, appear to be the least difficult to mobilize although their mobilization has to be accompanied by the mobilization of both military and civilian air transport from Aeroflot and possibly other civilian airlines such as the Polish LOT, Czech CSA and Hungarian Malév. In addition each Soviet truck has its own military registration number which requires it to report to the nearest military unit in the district where it happens to be at the time mobilization is decreed.

The Air Force needs relatively little preparation for mobilization as compared to its composition in peacetime but it requires the formation of additional fighting units, transport units and rear-area airfield units.

The Navy can transform some of its civilian ships into combat vessels by installing military equipment on those vessels and also prepare civilian ports and shipyards for a combat role.

During mobilization certain special units are formed directly by civilian ministries and departments. Thus civilian ministries are responsible for mobilizing repair shops and units, automobile transport, hydrometeorological services, hospitals and the medical corp. Depending on the situation, each civilian unit is mobilized on the spot. Persons with special skills who have not performed military service such as mechanics, radio operators, electronics experts, chauffeurs, telegraph operators, cooks, nurses, etc., are also mobilized on the spot either through civilian ministries or the local party organization.

Despite the involvement of various civilian ministries and local party organizations the final responsibility for drawing up the mobilization plans rests with the General Staff. The General Staff and the High Command are charged with mobilizing the reserves and the material and technical means of support for the Armed Forces. This total centralization may allow the Soviet Union to mobilize rapidly in a crisis provided the weapons and means of transportation are available or pre-positioned. The importance of maneuvers, means of transportation and pre-positioning of weapons is illustrated by the two crises which made necessary the mobilization of the Soviet Armed Forces: Czechoslovakia and the Yom Kippur war.

Based upon Soviet mobilization practice which so heavily emphasizes pre-positioning of large inventories, it may be deduced that Soviet planners tend to focus on the shock value of vast combat power in the initial phase of an engagement or in the climatic phase of a political crisis involving the manipulation of threats of force. This notion is reinforced by reference to the Soviet practice of maintaining large inventories of obsolete military equipment in the active inventory. Moreover, these preferences probably reflect a limited degree of confidence on the part of Soviet planners on the ability of their industrial base to respond rapidly to urgent mobilization contingencies.

4. The development of a mobilization base

The ability to conduct what we are describing as "mobilization warfare" implies an adequate R&D, industrial, and organizational base from which to begin.

The clandestine rearmament of Germany over a period of two decades, and particularly in the 1919-36 period, is a useful example of the contribution to a large-scale mobilization capability that can be obtained through careful attention to a mobilization base. Of course, the rearmament of Germany was conducted in a clandestine and illegal manner in that the Treaty of Versailles prohibited the rearmament of Germany in the manner in which the German government carried it out following World War I, but the lessons are useful for contemporary mobilization base planning.

It is important to note that this clandestine rearmament of Germany covered virtually all of the areas which are significant for construction of a mobilization base for any nation. These include the following:

1. A manpower infrastructure and organization; the skillful development of cadres preceded later German mobilization with a basis for a rapid build-up of military forces. Organizations existed in both the form of "paper plans" for more rapid expansion, and actual units formed where the cadres had sufficient training as a unit to enable them to effectively provide the basis upon which full-sized units could be assembled.

2. Research and Development. Research and development was conducted along lines which supported the conceptions of the general staff concerning the character of future warfare, particularly the employment of relatively small (by World War I standards) but highly mobile armies with extensive use of air power. The actual construction of prototypes and their use in maneuvers or in foreign theaters of operation provided a technical basis for drastically cutting lead times for the development of high performance mechanized equipment and aircraft. In addition, the clandestine prototyping of other weapons such as field artillery, anti aircraft artillery, and small arms, maintained the viability of a R&D community for the larger exploitation of available skills and manpower in the late 1930's when Germany's rearmament became overt.

3. Future Conflict Scenarios: Germany's post-World War I mobilization planning was less tied to any particular perception of a future adversary than it was tied to a perception of the character of future warfare. As a result, military mobilization plans were not overly influenced by the idiosyncratic properties of one or two adversaries. The driving force behind the German clandestine mobil-

zation base was the general staff perception of the future character of war, and not the anticipated political contours of Europe or the rest of the world.

Germany's behavior after 1936 when conscription was introduced and other measures taken in connection with the over-rearmament of Germany reflect, in large measure, the exploitation of the clandestine mobilization base which was assembled between 1919 and 1936. Germany's military leaders however had different theories about the lead-times necessary to fully exploit the mobilization base. In the case of the German navy, for example, the naval high command had established a target of 1945 when a naval build-up would be completed. Similar extended lead-times were requested by the army and air force. For the most part however the extended lead times reflected demands for inventory building on the part of the military services rather than delays associated with development and early production runs. The memory of war-time materiel shortages from the First World War induced a powerful incentive for the German armed forces to produce sufficient inventories of materiel to avoid the problem of inventory depletion during a period of conflict.

5. Seven basic options for emergency readiness and mobilization programs

It is convenient to distinguish five levels of crisis tactics appropriate at various levels of international tension. The levels seem sufficiently distinct and important to justify planning for all of them, and for programs that provide several options at every level. They are:

Programs	Estimated time available
A. Emergency-readiness programs-----	0-6 months.
1. Desperate -----	1 hour-7 days.
2. Crash -----	2 days-2 weeks.
3. Emergency -----	1 week-6 months.
B. Tension-mobilization programs-----	3 months-2 years.
1. Wartime -----	3 months-1 year.
2. Peacetime -----	6 months-2 years.

Both A and B above should be compared with normal (3-7 years) and moderately accelerated (1-4 years) programs. The principal distinction between emergency-readiness and mobilization actions is the estimate made of the imminence of a possible nuclear attack. In practice, a variety of modular plans might be designed - for each of the crisis programs separately and for situations in which they occur in various sequences.

Emergency-readiness programs would differ from mobilization programs in tending to disregard post-emergency values, emphasizing short-term capability at the cost of normal procedures, and being willing to risk waste and inefficiency. A mobilization program is more sensitive to questions of cost and efficiency and to the needs of competing programs, especially military programs. The mobilization program prepares for prolonged tension, siege, or low-level war. It is prudent in the sense that it tries to prepare for the future, possibly even at the risk of some short-run increase in danger, by adopting protective measures appropriate to the degree of international tension.

Of the three emergency-readiness programs, the *Desperate* program may correspond to a state of national anxiety equivalent to that which might be found on a battlefield - such as might occur during an exemplary central attack or possible in the early stages of a bizarre crisis. Thus, either bombs have already exploded in this country or the possibility is believed to be a matter of hours away. The program is termed desperate in the belief that U.S. decision-makers would be willing to take large risks in human lives and pay little or no attention to immediate material costs in order to achieve the highest degree of protection possible for the threatened citizens. Thus, in this kind of crisis, authorities (if an evacuation plan is being implemented) might overcrowd railroad boxcars to transport evacuees to safer areas, even risking some casualties. Large amounts of property would be destroyed to provide protective construction. The government might attempt to evacuate the population of potential target areas.

The *Crash* program differs from the *Desperate* one in being less associated with terror, although sacrifices in procedure and cost are again accepted. But actions that would involve unusual human risks or extremely high economic costs would be avoided where possible. Evacuations, if part of the plan, would be less desperate, industries would shut down properly, and consideration would be given to the problems of assisting post-attack recovery efforts.

It is also important to consider the possibility of mobilization taking place after a declaration of war. This possibility has not been seriously studied in the

nuclear age, with its emphasis on sudden and decisive strikes. The declaration of war in 1939 was used by the Allies as a substitute for intervention in Poland, which was beyond their capabilities. And even the surprise Japanese attack on Pearl Harbor was preceded by two years of tension and partial U.S. mobilization. Similar symbolic or inconclusive confrontations are not impossible in future conflicts. In such a situation, particularly if it involved a formal declaration of war, we might, as in World War II, devote up to half our GNP (or more than \$300 billion a year) to defense purposes. Thus, if advance preparations had been made, one could imagine tens of billions of dollars put into a civilian defense program in less than a year.

Such a program would tap the readily deployable U.S. construction industry (with a theoretical capacity of about \$100 billion) and other industry and agriculture (for survival and recuperation stockpiles). If extensive, modestly expensive, preliminary preparations (which might take two or three years and cost in the neighborhood of \$1 billion or so) had been made to take advantage of this tension period, a nonmilitary defense program could be phased so as not to compete excessively with military mobilization, much of which is necessarily slower.

Thus, the effectiveness of crisis programs could be increased considerably by appropriate peacetime planning to reduce the long lead times that would otherwise be necessary. Such programs should be tailored to the local needs and capabilities of the various communities or regions involved. In this regard, the more detailed regional and local planning might be performed by planners with local or regional responsibility.

6. Criteria for determining appropriate mobilization programs

Since a larger number of mobilization actions can be conceived than can be implemented it is advantageous to have a set of criteria by which the appropriate programs can be selected. Listed below are some suggested criteria for the evaluation of the possibilities available.

(1) *Threat value* (can be both positive and negative).—To what extent does an enemy perceive the existence of a new system as a threat? For example, an enemy who feels that our present nuclear force is quite capable of destroying his society may find it difficult to be impressed by a trebling of the forces opposed to him. But a third party may still find such growth impressive.

(2) *Leverage*.—The cost to counter a given expenditure on our part. Ideally it should be high enough to be a net benefit to us, but not so high as to induce an enemy to give up the attempt to counter. For example, our analyses of the air defense problem seems to have suggested so much leverage on the part of the Soviet strategic forces as to induce us very nearly to give up strategic air defense.

(3) *Capital intensity*.—In general it takes longer to train experts than to make equipment if manufacturing proceeds from a well established industrial base. Furthermore, it is difficult to keep very large contingents of specialized professional manpower mobilized over long periods of time. But likelihood of a serious lapse in military power in the near term provides a great incentive for the enemy to play a waiting game. A very important factor in the origin of World War I was the realization on all sides that mobilization was a short term affair. Hence it could make sense only were war imminent. "mobilization means war." This truth holds for any labor-intensive mobilization. A modern example is the case of Israel.

(4) *Durability*.—Equipment which does not last for very long is analogous to reservists who cannot remain mobilized for long. A country which buys large quantities of very perishable major equipment—e.g., weapons which have a short mean time to failure but are unaccompanied by spares—is effectively declaring war. It is also, therefore, inviting preemption.

(5) *Dislocation of economy*.—This is an important factor in determining how long the capability achieved by mobilization can be maintained. It is always of consequence whether or not any outsider can estimate accurately its impact on the duration of the mobilization, or, rather, on the duration of a high level of mobilization. This would be particularly vital were mobilization to be achieved by a kind of national economic spasm, one which would leave an aftermath of exhaustion and low capability.

(6) *Phasing*.—We can divide most military systems into the parts which fight and the parts which support the fighting elements ("teeth" and "tail"). Only rarely are "teeth" and "tail" parts of the same physical package, i.e., there is always some choice as to whether teeth or tail is procured first, or whether both are built simultaneously. Now the teeth represent most of the apparent threat,

for it is difficult to gauge the contribution of the tail to the readiness of the system as a whole. The teeth also represent an immediate gain in military power, and their effectiveness in the absence of much tail is very scenario dependent. The question of teeth and tail in overall military structure is very much a matter of the confrontations we expect to contend with.

(7) *Shock Value* (technical breakthrough).—An extreme kind of mobilization potential is one which would increase our effective firepower by an order of magnitude almost instantly. In a moment of crisis it might be used by forcing an enemy into an irrational fear of U.S. military power. For example, imagine that for our tactical aircraft there was discovered an exotic "zip" fuel which would extend their range to thousands of miles, so that quite suddenly every U.S. tactical fighter-bomber would have to be counted a strategic delivery vehicle. The Soviets might obtain reports of this development, but they probably would consider the capability marginal. Then, in a crisis, a fighter-bomber overtly tests the zip-fuel over a two-thousand mile range, and general deployment is announced for both the aircraft and liquid fueled air-to-ground missiles. It would be the discontinuity in U.S. power which would provide the shock effect, an effect so sudden as to preclude sober analysis of its strategic inconsequence. A prototype of this phenomenon might be found in the effects of Sputnik on our own thinking.

(8) *Visibility and ease of evaluation*.—It would seem important that an enemy find it difficult to estimate precisely the state of the mobilization although he knows very well that a serious mobilization is proceeding. Ideally he should always overestimate the level of our readiness to restrain his impulse towards preemption. This leads to a bias in favor of important features of systems which are easily hidden, e.g., missiles carried internally or indistinguishable from pre-existing types; mobile systems which rely for their existence upon camouflage and concealment; systems whose effect depends very much upon such invisible elements as guidance or radar. In many of these cases there is almost no way, short of excellent espionage, to determine even approximately the state of deployment of the system.

Hence an enemy who most likely proceeds by "worst case" analysis, must overestimate the state of our readiness. Another way to make this point is to say that we can field a higher *apparent* capability more readily. For example, imagine a new strategic system consisting of an IRBM roughly the size of, and compatible with, such current naval missiles as Talos. These missiles are carried concealed in magazines; there is no unambiguous way to tell how many are aboard any given ship. We might find it difficult to produce numbers of such weapons, but the other side would tend to believe that all U.S. Talos warships were armed with the new IRBM. MIRV is an analogous case, and the published accounts of Vladivostok accord every MIRVable missile is counted as a MIRVed missile) give some idea of how such thought processes work.

The problem of developing and maintaining an adequate mobilization base appears to be a separable problem from other technological issues within the Defense R&D management process. It therefore seems appropriate that a partitioned budget request be considered specifically for mobilization purposes. The rationale for such a budget request is sufficiently distinct from traditional military R&D budgetary requirements that it could be presented separately in budget documents to the Congress and administered separately from normal R&D channels.

APPENDIX.—SUMMARY BRIEFING CHARTS

THE CONCEPT OF MOBILIZATION IN A NUCLEAR CONTEXT

There are a number of reasons why there may be sufficient time for a significant degree of mobilization.

1. A central war is most likely to arise out of prolonged lower levels of conflict.
2. Existing U.S. and Soviet strategic postures suggest many inhibitions on any early exchange of nuclear forces—ever more so on massive city targeting. E.g.:
 - Some relatively invulnerable forces;
 - Lack of effective active and passive defenses;
 - Poor historical performance by both sides in early stages of a crisis ("civilian" societies vs. "military" societies);
 - Institutional arrangements and historical experience which favor crisis negotiation.
3. Preparation for central war will begin in earnest only when either or both sides perceive that such a conflict is a serious possibility as a result of (any):
 - A limited nuclear exchange;
 - A major non nuclear land war in Europe;

A major war at sea;
A truly vital interest is threatened;
An ultimatum (explicit or implicit).

TYPICAL STRATEGIC MOBILIZATION SCENARIOS

Of the four scenarios given below, the first two are history, the third used to be the great fear of NATO, and the fourth is probably the great fear of the Warsaw Pact.

1. The "phony war," 1930 (5 months):
 - (a) Pre-crisis arms competition (UK, France, Germany and the U.S.S.R.).
 - (b) A major series of politico-military crises—
 Militarization of the Rhineland (1936);
 Anschluss (Austria) (1938);
 Sudeten crisis (1938-39);
 War in Poland (1939).
 - (c) De-escalation and negotiation (antagonists began a rapid buildup fearing a resumption of full scale conflict).
2. Korea (1950-53):
 - (a) Pre-war politico-military crises—
 Soviet invasion of Iran (1946);
 Soviet takeover of East European nations (1945-48);
 Berlin blockade (1948);
 Soviet intervention in Turkey and Greece;
 Soviet military buildup, post WW-II.
 - (b) Major turnabout in U.S. policy—
 Factor of four increase in defense expenditures in 18 months;
 Massive emphasis on strategic preparedness, especially active defense.
3. Successful Soviet attack on W. Berlin and subsequent de-escalation.
4. Uprising in East Germany gets out of control and escalates.

U.S. STRATEGIC FORCE AND AGGREGATE DEFENSE EXPENDITURES, FISCAL YEAR 1945-77 (TOA—Billions)

	Strategic forces		Defense expenditures	
	Constant fiscal year 1977 dollars	Current dollars	Constant "fiscal" year 1977 dollars	Current dollars
First year:				
1945.....	43.89	11.20	362.35	80.77
1946.....	16.24	4.06	172.90	37.08
1947.....	5.29	1.45	58.60	14.30
1948.....	4.89	1.50	45.98	12.16
1949.....	5.25	1.66	49.47	13.57
1950.....	7.06	2.46	51.55	15.44
1951.....	21.77	7.72	145.10	49.61
1952.....	31.54	11.27	184.58	62.72
1953.....	24.88	8.80	141.01	47.09
1954.....	14.01	4.85	99.17	32.17
1955.....	18.93	6.99	104.06	35.61
1956.....	24.68	9.62	110.46	40.45
1957.....	27.70	11.18	111.93	41.85
1958.....	26.54	11.02	110.09	43.07
1959.....	28.13	11.85	108.49	43.71
1960.....	24.25	10.30	102.43	44.62
1961.....	27.69	12.10	110.91	46.53
1962.....	25.01	10.84	118.53	50.20
1963.....	22.65	9.85	119.66	50.85
1964.....	19.08	8.50	115.43	50.65
1965.....	14.06	6.34	112.56	50.65
1966.....	13.05	6.12	140.26	65.85
1967.....	12.85	6.28	149.01	72.44
1968.....	11.10	7.22	150.25	75.63
1969.....	15.57	8.47	148.00	78.49
1970.....	12.01	7.00	132.51	76.03
1971.....	11.75	7.27	121.19	74.34
1972.....	10.91	7.27	116.47	77.48
1973.....	10.04	7.27	111.56	80.14
1974.....	8.47	6.80	107.32	85.06
1975.....	8.20	7.20	100.70	87.90
1976.....	7.77	7.26	105.32	90.26
1977.....	1.86	1.87	23.73	23.06
1977.....	9.40	9.40	112.71	112.71

LATE 20TH CENTURY PROTOTYPE MOBILIZATION CRISIS

1. Series of intensifying politico-military crises.
2. Miscalculation by the Soviet Union of US/NATO response:
E.g., an East European (GDS) uprising coincides with a collapse of the East German Army and leads to large scale border crossings.
3. A limited U.S.-Soviet military conflict:
E.g., brief multi-division battles (non-nuclear) leading to a Soviet occupation of West Berlin.
4. De-escalation and protracted negotiation.
5. Strategic mobilization.

PLAUSIBLE PROPERTIES OF A FUTURE U.S. STRATEGIC MOBILIZATION

1. Emphasis on active defense, particularly for W/I areas—
Missile defense;
Air defense.
2. Very large scale increases in strategic forces budgetary authority (75-150 billion initially) with much larger increases likely as a perception of a deep crisis spreads.
3. Need for highly capable systems to the political impact of increased perception of vulnerability by individuals.
4. Massive procurement.
5. Redundancy.
6. Proliferation of attack systems, both low and high quality.
7. Rapid increase in civil defense activities.

CHARACTERISTICS OF A SPECIAL MOBILIZATION SCENARIO: A FORMAL DECLARATION OF WAR BY THE U.S.

1. The declaration would have solemn and especially great significance for our enemies, allies, and neutrals.
2. The information transferred would have:
 - (a) Unambiguous factual content of great importance;
 - (b) Undeniable implications and symbolism;
 - (c) Highly uncertain interpretations or implications.
3. Its existence would preempt "ordinary" crisis negotiation and deny the stability of any recent *fait accompli*.
4. In some extreme crises it could be temporizing—a declaration is not a spasm response—and lead to deescalation of actual fighting.
5. But it implies a rapid response to any increased use of force.
6. It tends to force a decision by allies to cooperate actively.
7. It would justify many peripheral actions (blockades, interdiction, property confiscation, internment of hostile aliens, etc.).
8. It would tend to unify the national response—and increase defense spending enormously through mobilization.
9. It would convey the unambiguous message that a formal peace treaty will be required to settle all the important issues.

ROLE OF RESEARCH FOR MOBILIZING ACTIVE DEFENSES

1. Missile defense probably would be the most important and expensive effort.
2. Lead-time reduction becomes extremely important.
3. A program is required to facilitate rapid massive procurement of mutually reinforcing systems—
Boost phase interception;
Mid course interception;
Terminal interception.
4. A capability may soon be needed to support a war in space.
5. A capability is required for integration into other—high priority strategic mobilization programs—
Air defense;
Civil defense.
Major research objective: design systems which are highly effective, mutually supporting and which can be rapidly deployed at high levels of expenditure.

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- Senator PROXMIRE. Thank you, Mr. Kahn.

**STATEMENT OF DR. RICHARD GARWIN, IBM FELLOW AT
THOMAS WATSON RESEARCH LABORATORY**

Senator PROXMIER. Dr. Garwin.

Dr. GARWIN. My prepared testimony in itself and by reference to Dr. Panofsky's testimony emphasizes the degree to which recent Department of Defense stress on the package of civil defense and new strategic options (i.e., capability for efficient destruction of Soviet missile silos, together with "flexible response") is illogical and unphysical. Especially this committee with oversight responsibility for defense production should not be distracted by the civil defense question from its broader and unique responsibilities to which my prepared testimony is largely directed.

Our Defense Department is in perilous shape—its programs, its relation to the national security process and to the national economy. In presenting his fiscal year 1975 defense budget, then Secretary of Defense Schlesinger noted the Defense Department's budget would have been \$5 billion smaller if the administration had not felt the need for a stimulation to the economy. Why should the Defense Department be the balance wheel of the economy, buying defense capability earlier than necessary, in the view of the Secretary of Defense himself? In later correspondence with the Senate Budget Committee, Secretary Schlesinger argued that the Budget Committee cuts would not save money for the Nation, because no other department or agency was prepared to spend that amount of money on short notice, and a cut in the defense budget would thus cost jobs and taxes.

How did this situation come about? In 1967 I tried, through the President's Science Adviser, to have President Johnson provide funds to the agencies and departments to enable them to plan programs and execute their early phases in other departments, as well as the Defense Department, so that the heavy annual expenditures of the Vietnam war—at the end of that war, sometime in the dimly seen future—could be transferred rapidly to well prepared programs serving current and future needs. Many examples come to mind. Then as now, the Defense Department was not interested in providing alternatives for the spending of tens of billions of dollars a year, and the Administration, then as now, was unsure of its ability to resist the pressure of well-prepared programs waiting for decision for further funding.

Thus, the DOD boasts of its ability to spend money. My full testimony reflects the present situation in which we are spending tens of billions of dollars annually on excessively complicated new models of old-fashioned systems now rendered obsolete by new developments, notably by cruise missiles and NAVSTAR navigation satellites. These are well within our grasp to adopt as important replacements for these new models of old systems, giving a simultaneous improvement in effectiveness and reduction of vulnerability and cost.

But the President and the Secretary of Defense now put forth as a positive benefit the very spending of money itself, to show that we are able to match increasing Soviet expenditures (which we estimate in dollars, at U.S. cost), for buying those items of Soviet equipment and paying those Soviet personnel in uniform at U.S. prices.

Thus, looming large in the Soviet defense budget is the great increase in U.S. pay scale in recent years in connection with the all-volunteer Armed Forces.

Since the Russians have some 4 million people in uniform compared to our 2 million, a pay increase reflected as a \$15 billion rise in the U.S. budget must be reflected in about a \$30 billion increase in the Soviet budget. That increase, the \$15 billion in the Soviet budget over our own, is simply because we pay our own people better; our paying higher salaries to our military is cited by the Defense Department as increased military spending by the U.S.S.R. Evidently, the relative size of the defense budgets in dollars is not an adequate guide to U.S. action.

Even in these days of high costs for postage and telegrams, there must be a cheaper way to communicate some message to the Soviet Union and to neutral nations and allies than the \$300 million requested a few days ago by the Secretary of Defense Rumsfeld and President Ford for the purpose of continued production of Minuteman III. This kind of signaling distorts our own process of defense planning and analysis.

For instance, you will remember that the increased emphasis in modern times on civil defense accompanied Secretary Schlesinger's desire for more flexible options, linked inextricably in the Secretary's speeches (but not in logic) with a force of hard-target killers—missiles that are capable because of their accuracy and yield of efficiently destroying Soviet missile silos. These were requested in view of Soviet progress (claimed by DOD spokesmen) in obtaining improved capability to destroy U.S. Minuteman silos.

I remind the committee that the current view of the Soviet threat to the Minuteman silos is very different than that foreseen by Secretary Laird in the 1960's, who saw in being by 1975 a force of SS-9 MIRV's, SS-9 mod 4's—Multiple Independently Targetable Reentry Vehicles—then just seen initially by intelligence capabilities in tests, were going to somehow be transformed from multiple reentry vehicles to independently targeted reentry vehicles. Secretary Laird said there was "no doubt that the Soviet Union was going for a first-strike capability." He must have had in mind the U.S.S.R.'s SS-9 mod 4, which does not even now exist as a threat to the United States' Minuteman force.

In more recent times it was completely illogical that the force of hard-target killers which Secretary Schlesinger requested in response to Soviet improvements in capability to destroy silos, would really be developed in case the Soviet force were further expanded and actually realized the potential which the Secretary claimed. A force of hard-target killers on our side would be of no use at all in reducing the vulnerability of Minuteman, which was the Defense Department's avowed intent.

Indeed, we would have gone, in my opinion, to mobile-proliferated launchers rather than the hard-target killing force (silo-killing force), in response to this Soviet development, having wasted funds, time, and the credibility of those in Congress and outside who accepted the DOD arguments and suggested their program which in fact did not respond even to the stated threat.

My full testimony describes more logical solutions to the defense problems, solutions which are impeded by the current organization of the Defense Department and by just this emphasis on large budgets for their own benefit.

I agree with Mr. Kahn: If our allies and neutrals believe that the Soviet Union has an edge, a military edge, it causes a substantial

change, and an unfavorable change in their actions. But I believe that the way to keep them from believing that the Soviet Union has an edge is for the Administration to stop saying to the Congress, and to the world, that the United States is weak; that if we are not second now, we will shortly be second unless large amounts of funding are provided for programs of old-fashioned technology like the B-1 and TRIDENT submarine programs, which have not had the full support of Secretaries of Defense in the past, but which have had a momentum of their own and continue, even though unjustified by the fact.

I look forward to answering questions from the committee.
[Complete statement follows:]

TESTIMONY OF RICHARD L. GARWIN

In this prepared testimony, I respond to the committee's request for comment on the broader questions which determine the shape of our preparedness planning and programs. The committee's examination of the adequacy of the nation's industrial, economic, and civil readiness can serve an important function in reviewing our military capability from an unusual vantage point—that of defense process as well as defense programs. Although I have long been involved in military questions—making technical contributions to our potential programs, evaluating U.S. capabilities against potential opponents, and assessing alternative U.S. defense programs, at this hearing, of course, I testify as an individual citizen and not as a representative of any organization.

INTRODUCTION

The utility of a civil defense program, and thus the choice of the optimum civil defense program depends very much on strategic capabilities and doctrine. In this matter, I support Dr. Panofsky's position as stated in his prepared testimony. I presented similar views which were published in a pre-hearing print of the Committee on Foreign Relations September 18, 1975.

I want to use the civil defense/strategic doctrine issue to illuminate some of the broader questions which the committee might explore in its later hearings, questions related to the manner in which we buy force which cannot be used, which are excessive in numbers and excessively vulnerable as first procured, and which are excessively costly.

THE NONSEQUITUR

New philosophy presented by the Secretary of Defense is often unaccompanied by programmatic change. Dr. Panofsky has pointed out how new emphasis on civil defense was expounded more than a year ago, with no apparent impact on the program. Important defense programs are unrelated to either threats or technological opportunity. Existing capabilities and potential for improvement are ignored either intentionally or through ignorance. Neither alternative instills confidence that our national security is well looked after. Some examples follow:

(1) In the 1970 message on U.S. foreign policy for the 1970s the President asked "Should a President in the event of a nuclear attack be left with the single option of ordering the mass destruction of enemy civilians in the face of a certainty that it would be followed by the mass slaughter of Americans?" Is it credible that President Nixon was unaware that our Minuteman forces had, right then, the technical capability of being launched as individual missiles or in small numbers against any target complex prespecified by the President? Many took up the cry, prescribing new weapon systems to provide the President with capabilities we already had!

(2) Another example arose during the ABM debate in the late 1960s. Observers saw in the expansion of the Soviet SS-9 force (mod 4) a threat to Minuteman in the mid-1970s. In fact, Secretary Laird testified that there was "no doubt" that the Soviet Union was going for a first strike capability. Other Defense spokesmen argued that such a force could result in the U.S. losing its capability even for assured destruction against the Soviet Union. How this was to come about, given the large capabilities in the SLBM and bomber force was

never clear, but the argument was highly misleading even applied to the Minuteman force. What was not revealed was that only a small fraction of the Minutemen were targeted against "assured destruction targets," the vast majority of the warheads being applied against other military targets, of which there is an unending list. Naturally, if 10% of the Minuteman (for example) were normally targeted for assured destruction against the Soviet Union, the loss of 80% of our Minuteman in a preemptive Soviet strike could indeed impair our assured destruction capabilities (as limited to the Minuteman force). Just as obviously, a simple alternative target list for which all Minuteman are targeted redundantly against assured destruction targets, would preserve the Minuteman assured destruction capability unimpaired up to 90% loss of Minuteman, with substantial remaining capability far beyond that!

(3) A final example—immediately following the SALT I agreement of May 26, 1972, critics observed that Soviet missiles in general were much larger than U.S. missiles and thus identified a throw-weight gap. That this differential would have looked quite different had one included bomber payload is not in question here. Having identified this "advantage" of Soviet force over U.S. force, the Pentagon response, with the support of these observers, was to emphasize and to accelerate the B-1 bomber program and the TRIDENT submarine program. I have long been a supporter of the TRIDENT I missile (4,000 mile range) for retrofit into the Poseidon submarine, and I was dismayed to see this "acceleration" which obviously resulted in a several-year delay of the availability of the TRIDENT I missile, in favor of the TRIDENT submarine and the TRIDENT II missile (6,000 mile range). In fact, it was argued that the TRIDENT II missile would be available at about the same time as the TRIDENT I missile! Essentially no funds have up to this date been expended on the TRIDENT II missile, and we have far less military capability in prospect from this program than would have been the case had the program been limited to the TRIDENT I missile.

In 1972 testimony, I noted that the SALT I agreements permitted us to increase the payload of our missiles in Minuteman silos by a factor 3 or 4, that the Minuteman payload had originally been a completely unilateral decision on the part of U.S. Defense authorities, unconstrained by SALT, and that even in 1972 there was no interest in the Defense Department in increasing the payload of missiles in Minuteman silos. And that remained true for a long time.

(4) Secretary Schlesinger stressed the undesirability of the Soviet Union's obtaining a capability for efficient destruction of Minuteman silos and explicitly introduced a program to develop a silo-killing capability for our own missiles. But in what way would a silo-killing capability housed in those same "vulnerable" Minuteman silos have been a counter to a Soviet anti-Minuteman threat? Only if we had anticipated preemptively destroying Soviet silos!

Examples could be further multiplied of the independence of programs from threats, opportunity, or existing capability. My own judgement is that this is an inefficient and even provocative way to run the Defense Department. Arguing that we are weak where we are in fact strong (either from ignorance or to obtain funds for new programs) can provoke conflict. Testimony that we are strong where we are weak impedes needed reform. In all, this kind of activity reduces credibility in government, and buys less and less-controllable defensive capabilities than could be provided by informed, candid, competent Defense Department management.

Thus, civil defense should be regarded as a side issue—of interest in its own right, but capable of distracting attention from far more important questions in regard to Defense management and capability.

It is not clear that our nominal defense leaders can exercise the power within the Defense Department which we expect from their positions. The former Chief of Naval Operations, Admiral Zumwalt, apparently judged Admiral Rickover's emphasis on nuclear powered ships to result in less naval capability than could have been obtained with a larger fraction of oil-powered ships. Admiral Zumwalt's own proposal for sea-control ships (supplementary to the carrier program) fared poorly, probably because it was seen as a threat to the carrier program.

The Secretary of Defense, as well, has not been able to exercise power to replace one program with a more desirable one. Secretary Schlesinger evidently preferred the NARWHAL class smaller strategic submarine to the TRIDENT, but was unwilling or unable to cancel the TRIDENT submarine in order to initiate work on the NARWHAL program. As a consequence, it was the NARWHAL program which was killed.

My general conclusion is that decisive action by Defense leadership is necessary (but often not forthcoming) to ensure that the judgements and convictions

of the leadership are indeed reflected in the programs presented to the Congress. Too often we hear (too late to affect a program on which billions have been spent) that the leadership did not really support it. With this common background, I now suggest what this nation ought to be doing, taking into account existing capabilities, to respond to threats and to take advantage of technological opportunities.

STRATEGIC PROGRAM

B-52 successor.—The B-1 program should be terminated with no production of that bomber. Instead, the Defense Department should procure a slight modification of the commercial 747 aircraft to serve as a launcher of strategic cruise missiles of some 1500 nm range. My preference is for a cargo version of the 747 aircraft, arranged so that cruise missile storage racks and launchers could be loaded onto the aircraft and secured like cargo racks. Such an aircraft could also be equipped with the capability to serve as an aerial refueling tanker. It would thus be triple capable—cruise missile launcher, advanced cargo aircraft, advanced tanker. The other modification required for the cruise missile carrier ("CMC") role is to equip the aircraft with quick-start engines and ultimately with rocket-assisted takeoff.

The CMC-747 would carry nuclear-armed cruise missiles which are derivative of the Navy-developed submarine-launched cruise missile. The aircraft would never penetrate Soviet air space, launching its missiles in rapid fire several hundred miles offshore. The cruise missiles would penetrate Soviet air defenses at low altitude (perhaps 200 feet) navigating accurately all the way to the target by a TERCOM (terrain comparison) method. Such navigation could readily yield terminal accuracies on the order of 200 feet, independent of range and of location of the aircraft on launch, an accuracy far better than that of any other strategic weapon.

A fleet of 100 CMC-747s, carrying 50 to 100 cruise missiles each, would provide a better strategic capability than would the projected fleet of 240 B-1s. The CMC is not dependent upon tanker support. As the nuclear warheads proceed through Soviet air space, they present 5,000 to 10,000 completely independent vehicles which must be destroyed by Soviet air defense. Each of these cruise missiles has a smaller radar cross section than the B-1 aircraft, and a smaller vulnerability to surface-to-air missiles or to fighter aircraft. The CMC has a greater availability, since it is a far less complicated aircraft than the B-1. Even in airline service, some 747s are operated fifteen hours per day. Without the necessity for loading and unloading passengers and baggage, meeting convenient schedules, and so on, CMC 747s could do better if necessary.

As regards pre-launch survivability, the Joint Strategic Bomber Study of the Department of Defense emphasized (according to Director of Defense Research and Engineering Malcolm Currie) that it was the rapid response and takeoff of the strategic vehicle which was important, while toughness to nuclear weapons was of secondary importance. The training and operating costs for the B-1 far exceed those of the 747, since the critical part of the B-1 mission is for the aircraft and its pilots to penetrate Soviet air space at the same altitude and speed projected for the cruise missile— a demanding task and one which builds up metal fatigue in the aircraft, shortening its life and frequently demanding expensive strengthening programs. This low altitude penetration, of the B-1 itself, provides Soviet air defense the capacity to destroy all of the air-delivered nuclear warheads by concentrating on the less than 200 B-1 bombers long before they drop their bombs, launch their short-range attack missiles (SRAM), or launch their cruise missiles. And although the B-1 is capable of supersonic flight, its normal strategic mission is performed entirely subsonically. Nor is the B-1 any more controllable or recallable than the CMC as defined here.

Beginning now with the termination of the B-1 program, a CMC force with its cruise missiles could be obtained sooner than the B-1 force, with greater capability and less vulnerability, and at 25 to 40 percent of the cost. Comparable savings or greater would also be made in operating costs because of the less demanding training and the lesser flight time required. In these very rough estimates, no credit has been taken for the productive use of the triple capable aircraft as a tanker or military cargo aircraft when its participation is not required in the strategic ready force.

Strategic submarine program.—Recognizing that maximum reduction in our SLBM vulnerability against unknown ASW threats is to be obtained by deploying the TRIDENT I missiles in mixed loads with Poseidon missiles in Po-

seldon submarines, the TRIDENT submarine construction itself should proceed at minimum economic rate only on those submarines for which large procurements have already been conducted. The TRIDENT II missile program should be cancelled, and a new NARWHAL class submarine should be designed in due course. The Congress must demand from the Navy and the Defense Department an analysis of Poseidon operating life at various annual maintenance expenditure levels.

Minuteman defense.—Just as the Hawk anti-aircraft missile could have been deployed as an effective defense of Minuteman (only) against the SS-9 threat which the DoD spokesman perceived for the mid-1970's, so there exist effective and inexpensive defenses of Minuteman against the now-projected threat. I discuss several in a paper to be published in June, 1976, but I mention only one of them here. This involves the protection of Minuteman silos (and it does not work for the protection of softer or much larger targets like cities) against accurate reentry vehicles which, in order to maintain accuracy against variations in atmospheric conditions, must retain high speed to low altitude. A hardened defense of a Minuteman silo can thus be founded upon a series of trenches perhaps 2,000 feet north of the silo and 2,000 feet long (east-west), each of which may contain 10 tons of steel pellets and some tons of propellant or explosive. Completing the system is a very simple radar located about two miles north of the silo and with a range of a mile or less against the very large target presented by a reentry vehicle-flying directly over the radar.

A proper radar detection fires the steel pellets into the air; the attacking warhead runs into these pellets at hypersonic velocity and either destroys itself or explodes safely far from the Minuteman silo. The SALT I ABM Treaty permits development and test of such systems. Deployment is not permitted, but actual emergence of the threat to Minuteman could be met by a renegotiation of the Treaty to permit this specific defense. It would be consistent with the principle of the ABM Treaty "not to deploy ABM systems for defense of the territory of its country and not to provide a base for such a defense . . ." It would also be consistent with a guiding principle which I have proposed for SALT II or SALT III, namely that the Soviet Union and the U.S. will undertake not to impair the survivability of the other's strategic offensive force.

This principle is entirely compatible with militarily useful kinds of flexibility. It would be another approach to the reduction of threat to Minuteman, strengthening the development of the very specific silo defense capability I have just described.

CONVENTIONAL FORCES

Here I specifically endorse two defense programs—the production of the CAPTOR ASW mine, and the development and accelerated deployment of NAVSTAR, the global positioning system which will provide 20 foot accuracy to U.S. and allied military users worldwide.

Tactical aircraft programs.—The proliferation of "fighter aircraft"—F-14, F-15, and the light weight fighters, masks a real issue and opportunity. The purpose of tactical aircraft is primarily to conduct or to support attack on ground targets. In U.S. air operations against North Vietnam, often only four aircraft out of a flight of eighteen actually carried bombs, the rest being flak suppression, electronic countermeasures (jamming), air-to-air fighters and the like. Our aircraft in combat averaged about one sortie per day, and loss rates ranged up to more than 5% per sortie against heavily defended targets.

The maturing of microelectronics as evidenced in the ubiquitous pocket calculator, in NAVSTAR receivers and TERCOM guidance, together with the demonstration of low-cost expendable turbojet engines, makes it possible economically now to do this attack on stationary ground targets (and in many cases on moving targets) by means of non-nuclear armed tactical cruise missiles, carrying a warhead of 1,000 to 2,000 pounds of high explosives. The size and cost of such missiles depends very little on the range, up to ranges on the order of 500 nautical miles. Both ground-launched and ship-launched tactical cruise missiles should replace air-to-ground attack aircraft, and the resulting reduction in need for support aircraft will mean a veritable replacement of the entire tactical air force by the cruise missile forces.

Military cargo aircraft will still be necessary, but air defense over our own territory will no doubt be conducted primarily by surface-to-air missile systems (SAM). Actually, the threat of aerial attack is considerably diminished in this modified force, since our tactical aircraft on the ground are among the most valuable and vulnerable targets to enemy air operations.

AWACS.—The Airborne Warning and Control System lifts a radar to some 40,000 feet in order to extend its line of sight against low flying aircraft to more than 200 miles. That is the unique contribution of AWACS to air defense. Great technological performance is required of the radar because of the high speed of the jet AWACS itself over the ground. Very substantial payload capacity is required of AWACS because the aircraft contains not only the radar transmitter and receiver, but also computers, displays, and direction crew. The result is that the aircraft is very expensive and, because there will be few, is an attractive target for enemy attack.

A far better alternative is that demonstrated by the Air Force in 1960, where a lightweight radar was lifted by helicopter, holding it essentially stationary, and the received signal transmitted via data link to the ground. A cost in the range of \$1 million per radar (if one bought for U.S. and allied purposes some hundreds of them) instead of \$100 million per radar appears possible for such a system. It is valuable not only for air defense and for control of our own aircraft, but to give a picture of vehicular movement in an entire combat theatre.

As in so many of our defense hardware programs, *ad hoc* criteria can be introduced to disqualify the helicopter-lifted radar, but they don't bear analysis. Thus one can require the "AWACS" to dash at jet speed from a base a thousand miles or more away, pointing out that it would take the helicopter a long time. But, alternatively, the helicopter can be based and refueled anywhere, so it doesn't need to dash from a thousand miles away. And a lot of times that AWACS doesn't need to dash, either.

Sea forces.—I have already advocated the retrofit of TRIDENT I missiles into the Poseidon submarines as a modernization and improved capability for the sea-based arm of the strategic force.

The marvels of technological and human performance which are an aircraft carrier have in fact more than an existential goal. It is to provide the capability to conduct attack on ground targets. In fact, so large a fraction of the resources of the aircraft carrier and supporting task force go to self defense that it is easy to lose sight of this almost sole reason for existence of this \$3 billion complex. But if this primary mission is done in some other way, most of the reason for aircraft carriers disappears. Secondary missions can be performed in far cheaper ways.

The tactical cruise missile alluded to in previous paragraphs can be launched from military cargo ships at a cost which I estimate at about \$40,000 per missile. Such missile attack on ground target can be managed from remote locations, with only a minimal amount of communications support on the launching ship. Both the cost and the vulnerability of such modest military cargo vessels is thus much reduced below those of a ship constrained to launch conventional aircraft. The elimination of new aircraft carrier construction and of the need for support ships, would free an enormous resource for the modernization of the Navy and for a review of its primary missions of protection of the shipping lanes for military and civil cargo.

Land forces.—Whether or not one believes that the tank has finally been bested by anti-tank weapons, U.S. and allied forces should be given improved total capability to counter Soviet tanks. Emphasis should be placed on advanced mines, no more popular in the Army than was CAPTOR initially in the Navy. Improved and imaginative mine laying capability, and remote-fired, man-carried, guided anti-tank weapons. Clearly, in this brief space I cannot do justice to the needs of our land forces for improved mobility, defense against shrapnel, and the like. I shall stop here.

SUMMARY

In general, I am severely critical of the present emphasis in defense programs on high investment, low attrition forces. These by nature take a long time to develop and to deploy. They require a high investment in training as well, and an extremely high investment in defense of the primary resource itself. Furthermore, a high investment, supposedly low attrition, posture is critically dependent upon our estimate of the effectiveness of enemy countermeasures. An air force procured for an expected loss rate of 0.2% per day could operate for 100 days with about 80% of the aircraft surviving, if the defense indeed exacted a loss of 0.2% per sortie. If, on the other hand, the loss rate was underestimated and amounted really to 5% per sortie, only ten aircraft of that initial force of 1,000 would be left after 100 days of operation at a rate of one sortie per day.

Thus I emphasize low investment, high attrition forces. A tactical cruise missile which is not reusable can, in the absence of any defenses, destroy targets at

a rate limited only by the cruise missile's reliability—say 0.7 targets per cruise missile launch. If the defense exacts an attrition of cruise missiles at the rate of 5 percent per sortie, 1.05 cruise missiles will be required to destroy the same number of targets. If the defense effectiveness should leap to 50 percent per sortie, two cruise missiles are required to maintain the planned military capability. With manned aircraft, even very modest attrition rates make operation impossible.

Furthermore, modernizing a low-investment, high-attrition force costs far less, by definition, than a high-investment force. In the case of tactical cruise missiles, specifically, one might have a stockpile of some 100,000 such cruise missiles, enough for three months expenditure at a rate of 1,000 per day. Factories would be kept in readiness to produce cruise missiles at a rate of 1,000 per day, after a delay of three months so that an initial combat effort could be sustained. Modernization of the force involves modernizing the factory and the process, as guided by development and pilot production, and would not ordinarily involve the scrapping of the ready force. This is just one example of the linkage among the nature of weapons, our vulnerability to enemy countermeasures and the nature of the production, support, and transport facilities. It is important to assess this larger context, and the adequacy of the process by which such decisions are made.

Senator PROXMIRE. Thank you, Dr. Garwin.

STATEMENT OF DR. WOLFGANG PANOFSKY, DIRECTOR, STANFORD LINEAR ACCELERATOR CENTER

Senator PROXMIRE. Dr. Panofsky.

Dr. PANOFSKY. Thank you very much.

When Secretary Schlesinger announced his modified strategy as part of his fiscal year 1976 defense report, he included the phrase "Our civil defense program is and always has been an essential element of our overall strategic deterrence posture. Hence one would expect that the recent shift in emphasis to the more flexible strategic response policy * * * would be reflected in our civil defense program * * *."

The strategic doctrine announced as new is in fact by no means new. Secretary McNamara in 1961, after assuming office, announced his strategic policy in which so-called clean surgical nuclear strikes were to be the cornerstone of U.S. strategic response. President Kennedy was persuaded to proclaim a nationwide fallout shelter program.

Resulting from this was a large wave of "you can survive" publicity, followed by extensive private homeowners' fallout construction. This program met great public resistance. The moral issue concerning "the man with the gun at the shelter door" symbolized the dilemma as to how to deny entrance by your neighbor to your private shelter already filled with your family.

Secretary McNamara himself became convinced in time that a major civil defense posture as an integral part of strategic planning was both futile and damaging; moreover such a policy would be escalatory because it would project to the world the picture of a nation difficult to deter from striking first.

As a result of the negative experience with an extensive civil defense undertaking, President Kennedy replaced the home shelter program with a Federal survey, marking, and stocking program. Such a low key publicly supported activity has remained the essence of U.S. civil defense posture until today.

The new doctrine as announced by Mr. Schlesinger has caused little change in the DOD budget for civil defense and little change in government organization. In fact the actual budget of the Defense Do-

partment for civil defense has been substantially decreased for fiscal year 1977.

In all these discussions there is a continuing lack of awareness of the physical realities of nuclear war. Former Secretary Schlesinger's doctrine made the implicit assumption that if the United States would adopt a city-avoiding counterforce option the Soviets are likely to do the same. Accordingly he stated, "As noted last year, a Soviet counterforce attack which deliberately avoids our cities would still produce a large amount of nuclear fallout which could drift over areas which are downwind from strategic military installations. This civil defense option would complement the military response options that we are now introducing into our planning to strengthen deterrence against a Soviet counterforce attack." This assumption has, among other things, the following fatal flaws:

1. There is no guarantee whatever that the Soviets in response to a U.S. counterforce attack will not launch massive nuclear retaliation including either or both civilian and military targets.

2. It is assumed implicitly in the policy that once a limited nuclear conflict has commenced it is likely to remain limited, yet it is extremely difficult to visualize a situation where successive moves and countermoves between the opponents would not escalate into all-out nuclear war.

On purely technical grounds the Soviets have, of course, the capability of carrying out certain types of controlled nuclear warfare. However, in all technical elements of nuclear weapons systems which are an asset to controlled use (accuracy, small nuclear warheads, extensive computer capability) U.S. technology leads that of the Soviet Union. For all these reasons I consider it to be an exceedingly dubious planning assumption that a U.S. limited and controlled nuclear doctrine will be reciprocated by the Soviets.

The fundamental difficulty with former Secretary Schlesinger's "new" doctrine is that it implies that by a new policy or a change in strategy it is possible to avoid the discomfiting fact that the population of the U.S. is hostage to the will of the Soviet Union, while, conversely, the population of the Soviet Union is hostage to the leadership of the United States. This mutual hostage relationship is a consequence of the overwhelming destructiveness of nuclear weapons and the huge numbers of such weapons now accumulating in the arsenals of both countries. The potential mutual vulnerability of the populations and industry of the two superpowers is singularly insensitive to choices in policies or doctrines of either side.

Limited nuclear attacks have been discussed in two respects: (1) as a "disabling" counterforce strike which would effectively eliminate the Minuteman arm of the U.S. strategic "triad" of U.S. forces; (2) as a partial nuclear strike accompanying various degrees of political blackmail. Let me concentrate here on the civilian consequences of a disabling strike.

Subsequent to the announcement of the new doctrine former Secretary Schlesinger in response to a congressional inquiry testified that fatalities in the United States collateral to a disabling attack against Minuteman would be 800,000. He stated that this analysis assumed 35 percent utilization of available shelters.

Congress was dissatisfied with this reply and DOD reanalyzed the matter. It appeared that the type of attack referred to in Secretary Schlesinger's testimony would destroy fewer than half of Minuteman forces, leaving the rest available for retaliation. In contrast an attack designed to destroy about 80 percent of the Minuteman forces would produce 18 million rather than 800,000 fatalities. Note that even the remaining 20 percent of the Minuteman force, let alone the submarine fleet or the strategic bombers, would constitute an enormous residual U.S. deterrent. This revised fatality calculation again assumed extensive utilization of fallout shelters.

I therefore conclude that a disabling counterforce attack against the United States of any military significance would be accompanied by enormous civilian casualties.

A "controlled" nuclear attack against the U.S. would have to be specifically tailored to be: (1) non-disabling to our strategic forces, (2) specifically designed and executed not to disrupt U.S. society, (3) specially configured and delivered not to disrupt U.S. communications, (4) launched from sites unambiguously designed for limited, low-yield, accurate strikes, (5) deliberately preceded by advance warning of the nature of the attack.

Such a controlled conflict scenario is simply absurd. Why should the Soviets take the enormous risk of such a limited move leading to all-out nuclear holocaust? How can they avoid errors in the targets actually struck? Why should they enter in such a limited controlled conflict with the U.S., knowing that U.S. forces are better tailored technically for such a purpose? Why should they adopt such a "shot across the bow" tactic if this violates their declared policy and has little, if any, military value?

I only quoted the most recent DOD analyses of shelter effectiveness against a disabling strike. Many other calculations which paint a more favorable picture have been occasionally made but most of them are seriously defective in a number of respects, such as:

1. The strike assumed is frequently of minor military value.
2. Shelter utilization is assumed to be much more complete than is realistic unless we have a thoroughly militarized and rehearsed population.
3. Post-attack casualties due to total disruptions of societal functions, maldistribution of food and medical care, and lack of essential services are ignored or underestimated.

Many of those features of modern life which we identify with an improved standard of living have impaired our ability to survive in a post-attack world.

Often proponents of shelter programs draw reassuring conclusions from studies of natural disasters such as hurricanes, floods, and earthquakes. Yet when such events occurred in the past the area of destruction was an island in the midst of an unaffected population from which help could be drawn and which could support evacuees from the disaster area; this will not be the case following nuclear war.

The above remarks demonstrate that shelter effectiveness as computed generally gives only a lower limit of casualties while the actual toll is expected to be much larger in practice. For the above reason I maintain that any reasonable shelter construction program will have

minimal effectiveness in case of any major nuclear conflict. In general defense of the population against large scale nuclear attack is much more expensive than the cost of an increased offense to negate the value of such a defense.

A more important consideration is the real, essentially social, price that must be paid in addition to the financial cost of an extensive civil defense program. Any expansion of the shelter program to attain significant effectiveness would require increased involvement of the civilian population with military preparedness.

Yet it is just such intense military involvement of the civilian population which has been rejected in the United States over and over again: it would indeed be paradoxical if after transition from the draft to a professional military force we introduced compulsory civil defense as an element of military strategy.

It has been argued that we must expand our shelter program because the Soviets appear to be doing just that. The very fact that proponents of increased defense expenditures and a harder political line are arguing that a Soviet shelter program indicates aggressive intent on their part bears witness to the fact that increased civil defense induces a military response and is thus an integral part of the arms race.

Recently the Soviet civil defense program has indeed been cited with increased frequency as a threat to strategic stability. Proponents of increased civil defense on the part of the United States even argue that the Soviet civil defense program might become so effective that a large fraction of Soviet cities could be evacuated and the population placed in shelters. After this has been achieved, so the story goes, the Soviets could issue an ultimatum to the United States to bow to Soviet demands, since the Soviets would no longer be deterred from a first strike against the United States by a threat of U.S. counterattack since the Soviet population would be "safe."

I consider this scenario absurd and unsupported by both technical fact and currently available intelligence. Reports of expanded Soviet civil defense programs have rested heavily on Soviet civil defense handbooks and a recent reorganization of the Soviet civil defense program. In civil defense preparedness against nuclear war there tends to be a large gap between rhetoric and program, and the printed word and effectiveness. If the profusion of civil defense handbooks published in the 1960s in the United States were a measure of U.S. civil defense effectiveness, then we would have a very good program indeed.

In the 1974 DOD report of the U.S. Defense Civil Preparedness Agency, the community shelter plan is quoted to be available for 152.7 million people, or about 90 percent of the population. If we read such statistics emanating from the Soviet side we would have great concern about Soviet aggressive intent. There is no evidence known to me of any really widespread Soviet training and evacuation programs and there is little question that there is insufficient transport available to support evacuation and that there are no pre-stocked receiving areas for relocating large Soviet urban populations. Soviet civil defense seems to concentrate most essentially on the protection of essential cadres and military production.

Although an overall assessment of Soviet civil defense is premature, there is little evidence that existing civil defense measures in the Soviet

Union can decrease casualties against U.S. attack significantly more than the U.S. civil defense program would be effective against a Soviet strike.

Let me summarize. The "new" strategic doctrine of flexible response is in fact not new: the connection of this doctrine to civil defense is in essence a replay of the early McNamara strategy which led to the ill-fated shelter programs of the early sixties. To assume that a doctrine of "controlled" U.S. nuclear strikes against the Soviet Union would be reciprocated by similarly "controlled" counterstrikes against which civil defense would be effective is folly indeed.

Soviet stated doctrines proclaim that any use of nuclear forces is likely to escalate to global conflict and Soviet nuclear forces are technically less adapted to "controlled" use than those of the U.S. Thus any assertion that the combination of "controlled" use of nuclear weapons by the U.S. and a civil defense program can reduce the risk to the people of the United States if nuclear war should commence is a cruel misrepresentation of the actual situation.

The Administration has paid little but lip-service to the need for increased emphasis on civil defense in view of the "new" strategic doctrine. The Defense Department civil defense outlays have been reduced for the next fiscal year and responsibilities for civil defense in the Administration as a whole are more fragmented than ever.

I personally am in favor of maintaining the current low profile civil defense pattern, and I support the idea of having a national disaster relief organization which can play and has played an important role in reducing suffering from natural or industrial catastrophes. However, Secretary Rumsfeld's FY '77 DOD report has specifically eliminated any substantial federal participation through DOD in providing civil relief in case of non-military disaster.

No civil defense program--large or small--and no shift in strategic doctrine can change the basic dilemma of our age that the peoples of both the U.S. and U.S.S.R. are in jeopardy in any kind of nuclear conflict. Only bold steps limiting and reducing the dispersion of nuclear arms among nations, both by negotiation and intelligent self-restraint, can offer hope that nuclear catastrophe can be avoided.

[Complete statement follows:]

TESTIMONY OF W. K. H. PANOFSKY--THE NEW STRATEGIC DOCTRINE OF CONTROLLED CONFLICT AND CIVIL DEFENSE

I appreciate the opportunity of testifying before you on the subject of the relationship of the new strategic doctrines to the need for Civil Defense. I am testifying as an individual citizen who has a long standing interest in the control of arms to increase the real security of this country and the world.

A. RECENT HISTORY

The issue of the strategic role of civil defense was brought to renewed public attention in former Secretary Schlesinger's FY '76 Department of Defense Report to the Congress. In that message Mr. Schlesinger stated, "Our civil defense program is and always has been an essential element of our overall strategic deterrence posture. Hence one would expect that the recent shift in emphasis to the more flexible strategic response policy . . . would be reflected in our civil defense program. That is indeed the case." This statement is somewhat puzzling when viewed in terms of the actual budget and programs of the Department of Defense and also of other agencies. New obligational authority requested by DoD for civil defense has not varied substantially for the last few years and in fact

exhibits a substantial decrease in FY '77.¹ The decrease is justified by a proposed transfer of the responsibility for the non-military component of civil defense to the states and local authorities. Thus it is difficult to discern any real increase in effort toward protecting the population in case of nuclear attack consistent with the heightened rhetoric designed to emphasize the shift in strategic policy.

Although Secretary Rumsfeld in his FY '77 report to the Congress does not announce any change in strategic doctrine from that promulgated in the preceding year, his report is silent on the need for civil defense as being a necessary adjunct to the new doctrine. Thus it is difficult to comment conclusively on any actual impact of the new strategic doctrine on civil defense in view of the lack of any additional funding specifically justified in this respect.

The strategic doctrine announced as "new" is in fact by no means new. After former Secretary McNamara took office in 1961 he adopted an initial strategic policy in which so-called clean surgical nuclear strikes were to be the cornerstone of U.S. strategic response. This doctrine implied that "city-avoiding" attacks primarily aimed at military installations would be given priority in any use of nuclear weapons. As an adjunct to that policy President Kennedy was persuaded to proclaim the need for nationwide fallout shelter construction. Resulting from this was a large wave of the "you can survive" publicity followed by distribution of a variety of plans for home owners' fall-out shelters. Many firms sprang up offering to build or distribute fall-out shelter components or install complete systems.

As this program grew so did public resistance. The moral issue centered on "the man with the gun at the shelter door" caused many to face the dilemma as to how occupants of a shelter should be selected in case of attack. The matter of shelter drills in schools became a subject of criticism. Finally, Secretary McNamara himself became convinced that the use of a major civil defense posture as an integral tool of strategic planning was not only futile but actually damaging to the fibre of United States society and in itself escalatory because it would project to the world a picture of a nation difficult to deter from striking first.

McNamara became convinced that on technical grounds the protection offered by a major civil defense effort would be minimal in the case of a major nuclear war, whether initiated in a "city-avoiding" mode or otherwise. He concluded that whatever U.S. strategy might be, there is no way to be convinced that the Soviets would follow a similar city-avoiding attack pattern, and also it is impossible to acquire reasonable confidence that limited nuclear wars would remain limited. Accordingly President Kennedy and Secretary McNamara downgraded the public relations effort in connection with civil defense and shelter building. Most of the fallout shelter firms disappeared from the scene and only very few of the shelters of the home-built variety are still active.

The home shelter program, which involved many individual citizens in making decisions on civil defense matters, was replaced by a federal survey, marking and stocking program. Elaborate computer programs initially developed at the National Bureau of Standards were used to survey a large fraction of the larger buildings in the United States to determine what "protection factor" they would provide against fall-out radiation. The owners of these buildings meeting minimum standards were approached with an offer to mark qualified shelter spaces at public expense with visible signs and to stock them with food and minimal sanitary and medical supplies. In addition, various warning systems and communication networks were developed. This shift in approach to civil defense greatly decreased the involvement of the private citizen.

This switch from an intense "you can survive" shelter building program to a low-key, publicly supported survey, stocking, marking and warning program was accomplished reasonably successfully and it remains the essence of the United States civil defense programs until today.

¹ The civil defense funding pattern as contained in the annual MOD reports is as follows:

Fiscal year:	Millions
1974	\$80
1975	87
1976	87
1976*	20
1977	71

The fiscal year 1977 figure includes \$7,000,000 contained in the Army budget in fiscal year 1976.

CURRENT STATUS

While funding for civil preparedness concomitant to the "new" doctrine is conspicuously lacking there has been organizational recognition of the problem. After the President abolished the Office of Energy Planning (OEP) in 1973, civil defense preparedness responsibilities were widely dispersed throughout federal agencies. The General Services Administration (GSA) was given responsibility for overall coordination of civil defense activities; in turn that agency established an Office of Preparedness in May 1974. This office has a sub-unit called the Conflict Preparedness Office which in turn has a Controlled Conflict Division. The bulk of civil defense funding remains in DOD, administered through the Civil Preparedness Agency.

These agencies, in particular GSA, have generated numerous studies on civil preparedness in connection with "controlled conflict." These studies have principally been political analyses dealing with conflicts in a rather abstract way. *What is lacking is a continued awareness of the physical realities of nuclear war.* There has been little interest in restudying the predicted quantitative effectiveness of civil defense measures under the various limited conflicts envisioned, let alone for all-out nuclear war.

C. WILL "CONTROLLED CONFLICT" STAY CONTROLLED?

What can one say technically about the relation of civil defense to the new/old strategic doctrine of controlled conflict? Mr. Schlesinger in his report to the Congress implied that the past strategic doctrines required an all-out retaliatory nuclear strike in reply to enemy nuclear attack. Instead he proposed that doctrine be changed to incorporate the ability to execute "flexible response options" where such options were to include attack against hardened targets. In many respects Secretary Schlesinger's "new" doctrine is a straw man: *It has always been possible for the President to give an acceptable answer to the question asked in the 1970 message on U.S. Foreign Policy for the 1970's: "Should a President, in the event of a nuclear attack, be left with the single option of ordering the mass destruction of enemy civilians in the face of the certainty that it would be followed by the mass slaughter of Americans?" The President always could have answered this question by stating that indeed he had the opportunity of ordering a "less than maximum" response.* This is a matter of variety in the plans for the use of strategic weapons and in improvements in flexibility of command and control of the strategic forces including the SLBM's, strategic aircraft and land-based missiles; it is not a question of the detailed fundamental design of the components of the strategic force, nor a matter of civil defense. However, the former Secretary went beyond the need for "flexible options": he proposed that the options which the President should be able to execute should include what is known as "counterforce" attacks, that is attacks on elements of the opponent's strategic forces, and that among such targets he should be able to attack successfully hard silos containing the enemy's ICBM's.

In connecting the need for U.S. civil defense with a change in U.S. strategic doctrine Schlesinger apparently proceeded under the assumption that *if the U.S. would adopt a city-avoiding counterforce option the Soviets are likely to do the same.* Accordingly, he stated: "As noted last year, a Soviet counterforce attack which deliberately avoids our cities would still produce a large amount of nuclear fallout which could drift over areas which are downwind from strategic military installations. This civil defense option would complement the military response options that we are now introducing into our planning to strengthen deterrence against a Soviet counterforce attack."

This is the background of the connection established by the former Secretary between civil defense and the new strategic doctrine. However, to me this entire pattern is, among others, the following fatal flaw:

1. The policy statement makes the implied assumption that if we adopted as an option a city-avoiding counterforce strategy, then the Soviets would do likewise. There is no guarantee whatever that this would be the case. The Soviets in response to a counterforce attack might launch all-out nuclear retaliation including either or both civilian and military targets.

2. It is assumed, implicitly in the policy that once a limited nuclear conflict has commenced it is likely to remain limited, yet it is extremely difficult to visualize a situation where successive moves and countermoves between the opponents would not escalate into all-out nuclear war.

The Soviet Union's declared strategic policy is in direct conflict with Mr. Schlesinger's assumptions on which he bases his proposal for a revived and strengthened U.S. civil defense. In all recent available strategic writings Soviet authors postulate that limited nuclear conflict is exceedingly likely to escalate to intercontinental world war. Soviet spokesmen explicitly object to nuclear war under pre-agreed "rules of the game".

Naturally one cannot conclude on the basis of declared Soviet strategic doctrine, which considers controlled conflicts unrealistic, that the Soviets would not adopt such a strategy if it were advantageous to them, and if they could in fact exercise such control.

On purely technical grounds the Soviets have, of course, the capability of carrying out certain types of controlled nuclear warfare. However in all technical elements of nuclear weapons systems which are an asset to controlled use (accuracy, small nuclear warheads, extensive computer capability) U.S. technology leads that of the Soviet Union. For all these reasons I consider it to be an exceedingly dubious planning assumption that a U.S. limited and controlled nuclear doctrine will be reciprocated by the Soviets.

The fundamental difficulty with former Secretary Schlesinger's "new" doctrine is that it implies that by a new policy or a change in strategy it is possible to avoid the disconcerting fact that the population of the U.S. is hostage to the will of the Soviet Union, while, conversely, the population of the Soviet Union is hostage to the leadership of the United States. This mutual hostage relationship, that is the relationship by which either population is at risk if attacked with overwhelming force by the other, is a consequence of the overwhelming destructiveness of nuclear weapons and the huge numbers of such weapons now accumulating in the arsenals of both countries. The potential mutual vulnerability of the populations and industry of the two superpowers is singularly insensitive to choices in policy or doctrine of either side.

D. "DISABLING STRIKE" VS. "CONTROLLED CONFLICT"

Limited nuclear attacks have been discussed in several respects: (1) as a "disabling" counterforce strike against the U.S. Minuteman silos effectively eliminating that arm of the strategic "triad" of U.S. strategic forces; (2) as partial nuclear strikes which carefully avoid civilian casualties and disruption of essential functions of society, and which are accompanied by political demands.

Let me discuss first the civilian consequences of a "disabling strike." The validity of the new doctrine implies that if a highly destructive and thus "disabling" attack against U.S. Minuteman bases occurred, then a shelter program would offer significant protection to hold collateral fatalities on the U.S. side to a minimum. We will show below that this assumption is dubious indeed.

After the former Secretary announced his new doctrine a Congressional inquiry was submitted to him asking what the collateral damage would be in case of an attack against Minuteman were launched by the Soviets. The first reply^{*} estimated such collateral fatalities to be 800,000. These fatality calculations were based on the assumption that 35% of the U.S. population remained in designated shelters which could reduce their radiation exposure to fallout by a factor of 50-100, and that they could stay in such shelters for one month. It was further assumed that 20% would stay for one month in residential basements and that the remaining 45% would remain in their houses, which on the average reduces fallout radiation by a factor of three.

The Congress was not satisfied with this reply since the attack for which this low number of fatalities was calculated clearly did not constitute a "disabling strike." In consequence, the Senate Committee on Foreign Relations requested¹ the Congressional Office of Technology Assessment (OTA) to conduct a critical review. In response to recommendations of a special OTA panel, the Department of Defense submitted a reanalysis calculating fatalities stemming from a number of attacks of varying severity against Minuteman silos. It appears from that reanalysis that the attack assumed in the original testimony of Mr. Schlesinger was carried out under meteorological conditions minimizing fatalities and was so weak that less than half of the U.S. Minuteman silos would be destroyed with the other half still available for retaliation. Clearly this would not be an effective

^{*} Given in testimony to the Subcommittee on Arms Control, International Organization and Security Agreements of the Committee on Foreign Relations, U.S. Senate on September 11, 1974.

¹ September 19, 1974 Letter Senator Fulbright to Senator Kennedy.

tactic for the Soviets to employ. An attack designed to destroy about 80% of the Minuteman force would produce 18 million rather than 80,000 collateral fatalities. Even the remaining 20% of the Minuteman force still constitutes a formidable retaliatory force. Obviously a Soviet threat to reduce the residual Minuteman force even further would produce even more collateral U.S. fatalities. DOD assumed a similar fallout shelter program as was used in the previous calculation with the exception that radiological protection factors were decreased by 25%.

Even an attack (such as the one discussed) which is deliberately city-avoiding so that population casualties are only collateral or incidental to the primary military objective of destroying the Minuteman force still produces enormous fatalities, even if very extensive shelter occupancy is assumed. If an attack is assumed where the opponent would deliberately attack other military targets such as air bases, submarine facilities and command centers, then fatalities would be still higher even if industry and population were not the primary targets. As a result the effectiveness of shelters becomes even less.

If it is assumed that the opponent chooses to deliver a "controlled" nuclear attack against the U.S. specifically tailored to be (1) non-disabling to our strategic forces, and (2) specifically designed and executed not to disrupt U.S. society, and (3) specially configured and delivered not to disrupt U.S. communications, and (4) launched from sites unambiguously designed for limited, low-yield, accurate strikes, and (5) deliberately preceded by advance warning of the nature of the attack, then indeed, a limited civil defense program would have some effectiveness. However such a "controlled conflict" scenario appears absurd. Why should the Soviets do such a thing? Why should they take the risk of such a limited move leading to all-out nuclear holocaust? How can they avoid errors in the targets actually struck? Why should they enter in such a limited, controlled conflict with the U.S., knowing that U.S. forces are better tailored technically for such a purpose? Why should they adopt such a "shot across the bow" tactic if this violates their declared policy and has little, if any, military value? It just does not make sense.

If U.S. civil defense against nuclear weapons has merit at all it is not against a controlled conflict but as protection against accidental launch of a small number of delivery vehicles or to limit damage from a domestic nuclear accident—either military or civilian.

F. THE EFFECTIVENESS OF CIVIL DEFENSE IN NUCLEAR WAR

There have been many analyses of shelter effectiveness; I will not go into detail here. The results of such studies exhibit the characteristic that for relatively weak attacks, involving few weapons shelter can be fairly effective, in particular if no nuclear weapons fall on or near centers of population. However, as soon as attacks intensify, either being directed specifically on population centers, or becoming sufficiently heavy to knock out large numbers of hardened or soft military targets, then shelter efficiency decreases greatly.

Many contradictory assertions have been made claiming large effectiveness for expanded shelter programs. However, I recommend to the committee that it examine critically the military value of those presumed nuclear attacks against which a U.S. civil defense program is claimed to have significant value, and examine the cost—financial and social—of such programs.

Those postulating substantial effectiveness of shelters tend to assume that shelter utilization would be all but complete. This in turn implies a thoroughly drilled and rehearsed population and excellent organization down to the grass roots so that each American citizen knows where his or her shelter space is to be. Adequate warning and full maintenance of stocks and supplies in the shelters are also postulated. Moreover, a new multibillion dollar construction program which provides new shelter spaces where available shelter space and population do not match is required.

One must also note that calculations of shelter effectiveness tend to ignore post attack casualties. The assumption is generally made that the shelter occupants are able to maintain life for, say, one month while fallout levels decay to acceptable levels; they then emerge and pursue their livelihood. Additional casualties due to total disruption of societal functions, maldistribution of food or medical care, and the lack of essential services are not included in calculations. Many of those features of modern life which we identify with an improved standard of living have impaired our ability to survive in a post-attack world.

Often proponents of shelter programs draw reassuring conclusions from studies of natural disasters such as hurricanes, flood and earthquakes. Yet when such events occurred in the past the area of destruction was an island in the midst of an unaffected population from which help could be drawn and which could support evacuees from the disaster area; this will not be the case following nuclear war. In short, the above remarks demonstrate that the effectiveness of fallout shelters computed in available detailed studies tend to provide lower limits of casualties: the actual toll is expected to be much larger in practice.

For the above reasons I maintain that the effectiveness of the type of shelter programs now in effect will be minimal in nuclear war. If this were the only criticism a persuasive case could be made for an intensified program. To increase meaningful protection to significant numbers of citizens the cost of a shelter program rises extremely rapidly. Estimates differ between proponents and opponents but run into the tens of billions of dollars. I will here not enter into details of cost estimates for more extensive shelter programs for which varying degrees of effectiveness have been calculated beyond noting that due to the neglect of post-attack casualties and realistically limited shelter occupancy, effectiveness is always overestimated; at the same time this committee well knows that construction costs of large-scale programs initially tend to be underestimated. *Defense of the population against large scale nuclear attack is much more expensive than the cost of an increased offense to negate the value of such a defense.*

A more important consideration is the real, essentially social, price that must be paid in addition to the financial cost of an extensive civil defense program. Any expansion of the shelter program to attain significant effectiveness would require increased involvement of the civilian population with military preparedness. As we learned from the ill-fated program of the early sixties, such involvement divides Americans and increases their anxieties. In addition we must face the cost in terms of military risk that establishment of an expanded and more meaningful shelter program would bring by increasing the likelihood of nuclear war.

Whether we like it or not, the survival of both U.S. and Soviet populations is at stake in case nuclear war breaks out for any reason, and whatever prevalent strategies or doctrines may be. If civil defense is to have any effectiveness at all in nuclear war, it must involve the entire population in an organized and exercised manner. Yet it is just such intense military involvement of the civilian population which has been rejected in the U.S. over and over again; it would indeed be paradoxical if after transition from the draft to a professional military force we introduced compulsory civil defense as an element of military strategy.

It has been claimed that civil defense is passive and will not provoke escalation response. However the facts belie this point. A widely disseminated and rehearsed civil defense program will necessarily project an image of a nation difficult to deter from initiating nuclear war and opponents will feel the need for increased deterrent nuclear power. It would indeed be paradoxical if after the United States and the Soviet Union have agreed in 1972 at SALT I not to defend the "territory of its country" with ballistic missile defenses, we would engage in extensive civil defense.

It has been argued that we must expand our shelter program because the Soviets appear to be doing just that. The very fact that proponents of increased defense expenditures and harder political line are arguing that a Soviet shelter program indicates aggressive intent on their part bears witness to the fact that increased civil defense induces a military response and is thus an integral part of the arms race.

F. THE SOVIET CIVIL DEFENSE PROGRAM

Recently the Soviet civil defense program has indeed been cited with increased frequency as a threat to strategic stability. Proponents of increased civil defense on the part of the U.S. even argue that the Soviet civil defense program might become so effective that a large fraction of Soviet cities could be evacuated and the population placed in shelters. After this has been achieved, so the story goes, the Soviets could issue an ultimatum to the United States to bow to Soviet demands, since the Soviets would no longer be deterred from a first strike against the U.S. by a threat of U.S. counterattack since the Soviet population would be "safe."

I consider this scenario absurd and unsupported by both technical fact and currently available intelligence. It is true that traditionally the Soviets have

spent a larger fraction of their strategic military budget on defensive measures relative to offensive weapons. For instance, the Soviets have deployed a vastly larger air defense system against strategic and tactical aircraft than has the United States. Even in the face of the treaty eliminating effective ballistic missile defenses the Soviets are continuing to deploy and maintain an exceedingly expensive air defense system. In contrast, the U.S. several years ago decided—wisely, in my opinion—to downgrade strategic air defense. It was recognized that it makes little sense to intercept a fraction of attacking enemy aircraft while at the same time being totally exposed to incoming ballistic missiles. The fact that the Soviets are continuing to spend vast resources on a military program does not mean that we should do the same thing. One might well conclude that the Soviets are wasting resources and acting against their own best interests in supporting an air defense establishment as large as is apparent; clearly institutional interests within the Soviet Union are partially responsible for this situation.

Reports of expanded Soviet civil defense programs have been receiving sporadic publicity within the United States; e.g., much attention has been given to a recent Soviet Civil Defense Handbook, issued in 1974, and translated and widely disseminated by the Oak Ridge National Laboratory. This handbook describes certain civil defense measures and shelter construction prescriptions; some of these are, however, technically flawed. More important, if civil defense handbooks were a measure of actual civil defense preparedness, then the U.S. has a very strong program. In particular, in the early 1960's a profusion of good civil defense handbooks was produced and distributed; yet no one would maintain that the U.S. had ever possessed a civil defense program of major effectiveness. *In civil defense preparedness against nuclear war there is a large gap between rhetoric and program, and between the printed word and actual effectiveness.* Both Soviet and U.S. national leaders and Secretaries (Ministers) of Defense have publicly stressed the importance of civil defense. The 1974 DOD report of the Defense Civil Preparedness Agencies (DCPA) lists identified U.S. shelter capacity as about 227 million persons and "Community Shelter Plan" spaces are said to be available for 182.7 million people, or about 90% of the population. If we read such statistics as describing Soviet shelter space there would be great concern about Soviet aggressive intent. Yet those familiar with the details of the U.S. program would hardly claim that U.S. shelters would blunt seriously a Soviet nuclear attack.

There is good evidence that since 1972 Soviet civil defense is being taken more seriously as is evidenced by an upgraded command structure. A Colonel General Altunin was appointed as Chief of Civil Defense and there is increased organizational activity.

There is other evidence of increased Soviet civil defense preparations after a lull in the early 60's: There are reports of shelters associated with some new apartment construction (many new Soviet apartments clearly are constructed without shelters; the shelter building program within Russia is, for instance, not anywhere near as complete as that employed in the cantons of Geneva and Vaud in Switzerland), but few shelters appear to be stocked. There have been field exercises simulating civil defense by large groups of Komsomol youth, and there are clearly a few hours in a school year which are dedicated to civil defense indoctrination. However there is no evidence known to me of any really widespread training and evacuation programs, and there is little question that there is insufficient transport available to support evacuation. Moreover, food supplies are clearly inadequate to support relocation of population of cities to the countryside, and there are no provisions for receiving entire urban populations. Soviet civil defense seems to concentrate most on the protection of essential "cadres" and military production.

Although an overall assessment of Soviet civil defense is premature, there is little evidence that existing civil defense measures in the Soviet Union can decrease casualties against U.S. attack significantly more than the U.S. civil defense program would be effective against a Soviet strike.

We therefore have two reasons for not responding to reports of increased Soviet civil defense preparations with an increased civil defense program of our own:

1. Even if there were an effective program on the Soviet side this is in itself no reason why we should imitate such a move.
2. There is no evidence that an effective Soviet civil defense program does in fact exist.

G. CONCLUSION

Let me summarize. The "new" strategic doctrine of flexible response is in fact not new; the connection of this doctrine to civil defense is in essence a replay of the early McNamara strategy which led to the ill-fated shelter programs of the early sixties. To assume that a doctrine of "controlled" U.S. nuclear strikes against the Soviet Union would be reciprocated by similarly "controlled" counterstrikes against which civil defense would be effective is folly indeed. Soviet stated doctrines proclaim that any use of nuclear forces is likely to escalate to global conflict and Soviet nuclear forces are technically less adapted to "controlled" use than those of the U.S. Thus any assertion that the combination of "controlled" use of nuclear weapons by the U.S. and a civil defense program can reduce the risk to the people of the United States if nuclear war should commence is a cruel misrepresentation of the actual situation.

The Administration has paid little but lip-service to the need for increased emphasis on civil defense in view of the "new" strategic doctrine. The Defense Department civil defense outlays have been reduced for the next fiscal year and responsibilities for civil defense in the Administration as a whole are more fragmented than ever.

Until former Secretary Schlesinger revived the need for a strong civil defense by coupling it with U.S. strategic counterforce policy, most public statements by the Administration based the existing program on a variety of other motives. First civil defense was identified to be an important adjunct to other means available for relief from natural or man-made (but not military) disaster. Secondly it was recognized that although civil defense would have minimal effectiveness against a large-scale nuclear attack by the Soviet Union it might reduce casualties against limited strikes from minor powers, and it would reduce the risk from accidental launch of a small number of nuclear weapons.

I personally am in favor of maintaining the current low profile civil defense pattern, and I support the idea of having a national disaster relief organization which can play and has played an important role in reducing suffering from natural or industrial catastrophes. However, Secretary Rumsfeld's FY '77 DOD report has specifically eliminated any substantial federal participation through DOD in providing civil relief in case of non-military disaster. I consider the concept of a "Dual-Use Civil Preparedness" to be most valuable, both toward rendering actual assistance in civil disaster and in diluting the military-strategic impact of the program. The reduction in Secretary Rumsfeld's FY '77 report of "those elements of the program which should be supported by state and local governments" and the elimination of those programs "previously required for natural rather than nuclear disaster" and reductions in "construction funds for emergency operation costs in areas which have a low probability of being directly affected by nuclear attack" appear to be moves in the wrong direction. The federal responsibility and organization for disaster control is already marginal, and it is doubtful that state and local authorities will compensate for the loss in federal programs.

No civil defense program—large or small—and no shift in strategic doctrine can change the basic dilemma of our age that the peoples of both the U.S. and USSR are in jeopardy in any kind of nuclear conflict. Only bold steps limiting and reducing the dispersion of nuclear arms among nations, both by negotiation and intelligent self-restraint, can offer hope that nuclear catastrophe can be avoided.

Senator PROXMIRE. Gentlemen, I want to thank all of you very, very much for your testimony.

These hearings, I think, might be viewed by some as talking about an impossible nightmare. The prospects of nuclear war are so horrible that I am afraid the overwhelming majority of people in this country and other countries have just put them out of their minds.

We know there seems to be a kind of a pulsation of a war about every generation. That may stop now. It may not, I think. That what you gentlemen have been testifying on this morning is extremely helpful to this committee and I think the record you have made is one that is going to be helpful to other Members of Congress as well.

You know, all of us look at our children and hope and pray they will be able to live out their lives, and then when we get into this subject, we envision the possibility, maybe a probability, that they won't be able to do so. There will not be much life left in this country or elsewhere in the world.

So it is a very, very painful, difficult subject to talk about, but we have an obligation to talk about it. I think you presented your viewpoints soberly and thoughtfully and with great understanding.

Now, before we turn to more specific points, I would like to address a half dozen general questions to each of the panel members, so we can help to establish our record for later deliberation.

Former SALT negotiator Gerard Smith in materials submitted to this committee states that current Pentagon planning—and I quote—“foreshadows a major shelter program in years to come.” He goes on to say, and I quote again, “As we get into a major civil defense program, I think pressures will build to abrogate the ABM treaty. It may seem illogical to be making major evacuation plans while depriving ourselves of the ability to directly protect our population by active defenses.” (Smith statement, see Appendix II, p. 147).

I agree that this is a major discrepancy. If we feel secure enough to deny ourselves defense such as an anti-ballistic missile defense system, why do we need *passive* plans such as evacuation plans and community fallout shelters?

Mr. Nitze, would you like to give us your view on what seems to be a contradiction?

Mr. Nitze. Mr. Chairman, I am not aware of any administration plans for an active shelter program, but maybe there are. I don't know. I don't know of them.

Senator PROXMIER. Well, as I say, I didn't say that Mr. Smith had said there was a plan. It is not in the budget. What I am talking about is the opinion that a major shelter program in years to come may be essential.

What is your reaction to that?

Mr. Nitze. I think it may be essential in the future; yes, I do. It depends upon how the situation evolves in the world and what the American appreciation of the threat is, but I can thoroughly sympathize with what Mr. Kahn has said, as one can see a situation arising in which the effort to make part of our population survivable would certainly be a wise thing to do.

I can't see any reason for believing that that might not come to be the American viewpoint.

Senator PROXMIER. Do you have a price tag for what that might come to?

Mr. Nitze. Every little bit would help in such a situation. I have an idea that the current program of \$80 million a year, which merely keeps an inventory of shelters which are available, is worthwhile.

Senator PROXMIER. Now, I wonder if every little bit does help.

Let me just challenge that for a minute.

What concerns me is the fact you spoke about the effects of the Hiroshima bomb and, of course, the technology has so incredibly increased since then. The megatonnage is so immensely increased, the accuracy, the enormously destructive capability is so great.

Isn't it likely that it would be extremely hard to limit nuclear war once it begins. Can you imagine if we have casualties of 5 or 10 or 20 million, any American President not saying we have to go all out and go all out immediately, and the Russians having the same kind of reaction, with the result—with the immense technology and capability of destruction—that any fallout shelter program would be just completely ineffectual?

Mr. NITZE. I don't believe so.

Senator PROXMIER. Give us the situation in which you think a fallout program might be helpful in a nuclear exchange between the two great superpowers?

Mr. NITZE. I think if we were to follow, for instance, Herman Kahn's scenario in which there were some months of buildup of tension and there were active evacuation programs and a shelter program, and if this would then be followed by nuclear war, as I pointed out in my testimony, two possibilities are involved.

One is that the pure theory of war would lead to the ultimate escalation. You can't exclude that.

The other consideration is that any policymaker would want to see that that didn't happen. You can't guarantee that full escalation wouldn't happen, but it would be the object of policy to keep it from happening.

Let's take the two extremes. Let's say it goes to an all-out exchange of violence. In the worst case—even in the worst case, if one had an active and efficient civil defense program—a lot of it has to do with the training and organization, where people do in fact get in a shelter.

I do not think it is impossible at all that you could under those circumstances get a protection factor of, say, 50 for the average person across the country which should reduce casualties to less than 20 percent of those to be expected if the protection factor were 6 as currently estimated by some.

Senator PROXMIER. I understand the Academy of Sciences has said that if the United States and the Soviet Union exchanged half of their nuclear capability, that this would eliminate, virtually eliminate the ozone and the result would be the destruction of plant, animal, and human life, at least on this continent and perhaps in the world.

Mr. NITZE. I believe this to be an overstatement. What I have read indicates that it is not a correct summary of the report.

Senator PROXMIER. Dr. Garwin?

Dr. GARWIN. There is a discrepancy between the desire for passive defense and a renunciation of active defense. I believe the new emphasis on civil defense is the entering wedge of a campaign which will result by slow steps in major shelter programs in the future, and that what has been done is to lay the foundation in an easy way to get the principle accepted, or to attempt to do so and to follow through with major expenditures.

I cannot see that this will continue without a demand for active defenses as well. And rather than come out openly and ask for abrogation of the ABM treaty, this would be a more subtle way to begin.

I think that the idea that nuclear war can be controlled, that "yes, indeed, it can start, but there is a possibility that it will not go to maximum destruction, and under those circumstances the shelters will be a help," is a bad idea.

It makes that war more probable.

I don't see how one can interpret Mr. Nitze's recent statement in any other way. If the Soviet Union saw no alternative, no way in which the United States could shelter its population, they would be quite sure that the war would go to maximum destruction and be deterred from beginning it.

The solution, I think, is increased emphasis on arms control, reduction in number of offensive missiles on either side. But one has to consider the utility of civil defense for peripheral damage to population in case of an attack by the Soviet Union on U.S. military capability.

Such an attack would make no sense, unless the Soviet Union could count on a full disarming strike to destroy Minuteman efficiently. Ten percent or 20 percent or 40 percent of the Minuteman would do them no good at all.

On the other hand, if the Soviet Union were to retarget their forces to cause maximum damage to U.S. population, we would not be talking about the optimum height of burst that Mr. Nitze mentioned, optimum height of burst for the two bombs used in Japan, that height of burst depends on the target structure. If one has unsheltered population and a light frame construction, the optimum height of burst there, I guess, was 1,800 feet.

For the higher yield in our Poseidon force, more than twice the yields used over Hiroshima and Nagasaki, the optimum height of burst would be higher.

If the population were sheltered if the purpose were to cause maximum disruption by knocking down large structures and blocking access or emergence, it would cost very little more to reduce the height of burst.

So one has to look not at the casualties which would result from a force that was unresponsive to this defense structure, but from the force which would result when the defense structure had been assimilated into the offensive force and the slight revision in targeting had occurred.

Senator PROXMIRE. Dr. Panofsky?

Dr. PANOFSKY. I fundamentally agree with Ambassador Smith's concern here.

As I stated in my testimony, there is at present a dramatic inconsistency between the rhetoric of the ex-Secretary of Defense saying an expanded civil defense program is an essential adjunct to the new strategic doctrine, while at the same time the budget is decreasing for providing one.

This is indeed the current situation, but he has clearly placed the groundwork for asking for expanded passive defense. Once you have done that, there is a clear inconsistency between the SALT I agreement where it is explicitly stated that each nation agrees not to defend the territory of its country, and an expanded passive defense program; therefore, the concerns which Ambassador Smith expresses are certainly real, although there is no evidence that in this year the Department of Defense is implementing what they are saying.

Now, I also believe basically that the Department of Defense currently does not propose large-scale civil defense. I believe a low visibility passive defense is an excellent idea as assurance against acci-

dents, civil or military, and to maintain a corps of trained personnel. I do believe that a large-scale passive defense program—

Senator PROXMIRE. You are not talking about fallout shelters.

Dr. PANOFSKY. No, not large scale. I would be opposed to that, beyond the present marking and stocking program which I support. I believe, if the program were identified where existing building spaces are being thoroughly marked and stocked, with good communications established, this would be a good thing. But, to go beyond that, I would not support; no, sir. The reason is—

Senator PROXMIRE. I don't see what benefit a fallout shelter would be in the case of an accident. If an accidental development occurs, people aren't going to be in fallout shelters.

Dr. PANOFSKY. No. If there is an accidental firing or a terrorist country attack or something of that nature, in that case indeed there will be a localized nuclear explosion, not a widespread attack, and therefore some distance from the event a fallout shelter of the kind which we have will save lives; there would be time to enter the shelter after the event.

Senator PROXMIRE. Can I ask you, Mr. Kahn, to comment specifically and directly on what seems to be an inconsistency.

If we need a civil defense shelter program, don't we also need an antimissile missile system? Doesn't one justify the other?

Mr. KAHN. I would say there is no inconsistency other than the classic one of tradeoffs. In other words, when you trade off some of one for the other, there is an inconsistency in the sense there is tension between the two objectives.

Life is filled with inconsistencies like that. I have to choose between sending my kids to a better school, or buying a better house, or a better pension, or buying more insurance.

Further, the fact I buy more of one of these today and less of another doesn't mean I will go overboard in the future. There are people who believe, if you start with abortion, you inevitably go on to infanticide and, if you go on to infanticide, you inevitably go to euthanasia.

Senator PROXMIRE. I am not talking about infanticide. I am talking about an ABM.

Mr. KAHN. I insist the idea that every time we start something we almost inevitably go on to the limit is such an extreme position that it should not be taken in serious conversation on most of these issues.

Senator PROXMIRE. What was your position, Mr. Kahn?

Mr. KAHN. My position has been relatively constant for about 20

years now. We put out a report on civil defense in 1955. We analyzed program, much like the current program which included shelter marking and sirple stocking of \$100 million to programs of \$150 billion which included blast shelters.

We argued that the more you spend, the more you got, subject to arms race issues—which is a problem. We came out for a cheap program which we are still in favor of. This is more or less the current program which is of great value. We would add to it a much more serious evacuation ability and that is about all, at the present moment.

Senator PROXMIRE. What do you mean by cheap program? How many dollars? How big?

Mr. KAHN. Anything less than \$1 billion a year is cheap, in our terms. The current program is very cheap.

Senator PROXMIRE. So you think we could go from the present \$80 million to \$1 billion.

Mr. KAHN. I would guess if I had to choose a number, it would be \$300 or \$400 million. But if it is less than \$1 billion, I would still call it cheap in comparison with the rest of the defense budget.

I would like to make one other point, though. I find it hard to imagine a war starting with a large first strike which is directed at cities. There is no rationale that any war party can advance to any government why the first strike should destroy cities. I would argue it is almost impossible to give such a rationale.

Senator PROXMIRE. Why is that?

Mr. KAHN. In any large first strike that the United States might launch against the Soviet Union or Soviet Union against the United States, I would argue that with probability, say 0.9 or so, but with no certainty, of course, such a strike would be launched largely against military targets and carefully avoid cities, even, if necessary, at the cost of decreasing the damage to military targets. Again I would almost defy anyone to formulate any plausible conversation, between a planner and civilian leader, which doesn't lead to that conclusion.

Senator PROXMIRE. I have some charts around the room that are prepared on the basis of the assumptions by the Defense Civil Preparedness Agency. They make what, I think, are what might be called "best case" assumptions. They reflect postnuclear blast damage and fallout areas for three states: New Jersey, Wisconsin, and Texas. These also state the number of citizens "at risk" for each area; "risk" seems to be a euphemism for potential casualty.

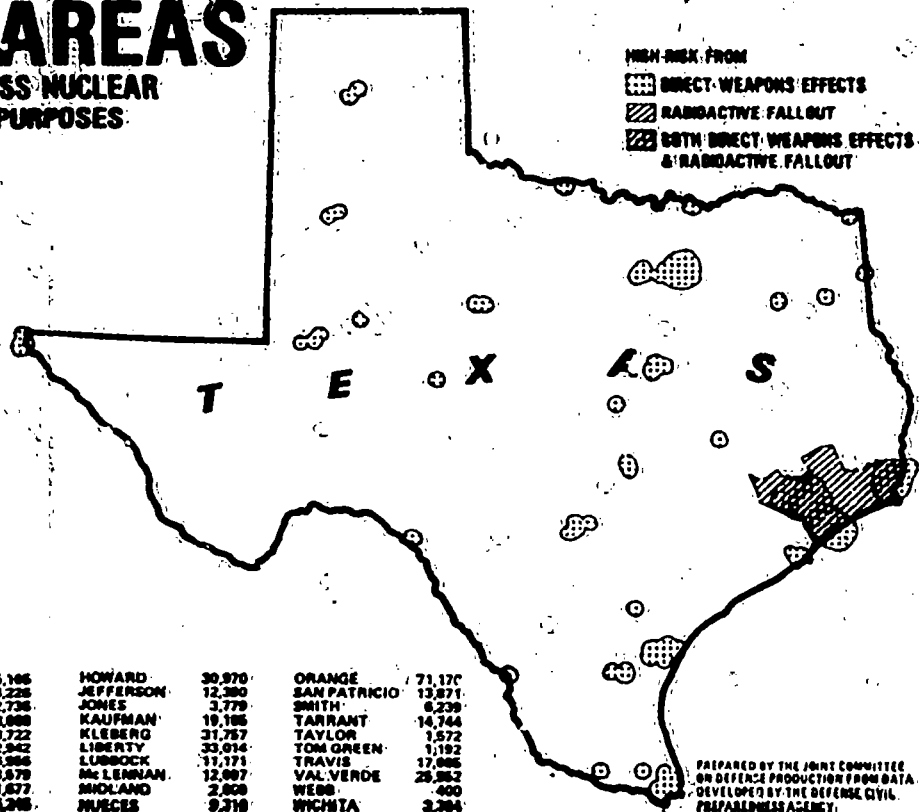
HIGH RISK AREAS

FOR CIVIL PREPAREDNESS NUCLEAR
DEFENSE PLANNING PURPOSES

COUNTIES	TOTAL POPULATION AT RISK
URBANIZED AREAS	
BEXAR (SAN ANTONIO)	77,513
BORIE, MILLER, ARIZONA (TEXARKANA)	58,579
BRAZOS (BRYAN)	51,386
CAMERON	103,888
DALLAS, COLLIN	1,375,511
ECTOR	81,646
EL PASO	337,471
GALVESTON	151,744
GRAYSON	56,343
HARRIS, FORT BEND, BRAZORIA (HOUSTON)	1,871,382
INDALGO	91,741
JEFFERSON, HARDIN (BEAUMONT, PORT ARTHUR)	232,824
LUBBOCK	150,135
MC LENYHN (WACO)	118,843
MIDLAND	60,371
NUECES, SAN PATRICIO (CORPUS CHRISTI)	212,870
POTTER, RANDALL (AMARILLO)	127,010
SMITH (TYLER)	59,781
TARRANT, JOHNSON, PARKER (FT WORTH)	840,117
TAYLOR, JONES (ABILENE)	80,571
TOM GREEN (EL ANGELO)	63,894
TRAVIS (AUSTIN)	284,488
WEBB (LAREDO)	79,197
WICHITA, WICHITA FALLS	97,544

NON-URBANIZED AREAS

LEE	18,706	ECTOR	5,186	HOWARD	30,970	ORANGE	71,170
BELL	86,356	EL PASO	4,225	JEFFERSON	12,380	SAN PATRICIO	13,871
BEXAR	38,527	PORT BEND	2,736	JONES	3,779	SMITH	6,239
BORIE	22,256	GALVESTON	18,888	KAUFMAN	10,185	TARRANT	14,744
BRAZORIA	61,285	GRAYSON	3,722	KLEBERG	31,757	TAYLOR	1,572
CAMERON	22,286	CREIGHT	2,942	LIBERTY	33,914	TOM GREEN	1,192
CHAMBERS	12,157	QUADALUPE	6,366	LUBBOCK	11,771	TRAVIS	17,086
COLLIN	1,788	HARRIS	88,579	MC LENYHN	12,697	VAL VERDE	25,352
CORYELL	21,888	HARRISON	1,577	MIDLAND	2,509	WEBB	400
DALLAS	12,944	INDALGO	16,285	NUECES	9,318	WICHITA	3,384



PREPARED BY THE JOINT COMMITTEE
ON DEFENSE PRODUCTION FROM DATA
DEVELOPED BY THE DEFENSE CIVIL
PREPAREDNESS AGENCY

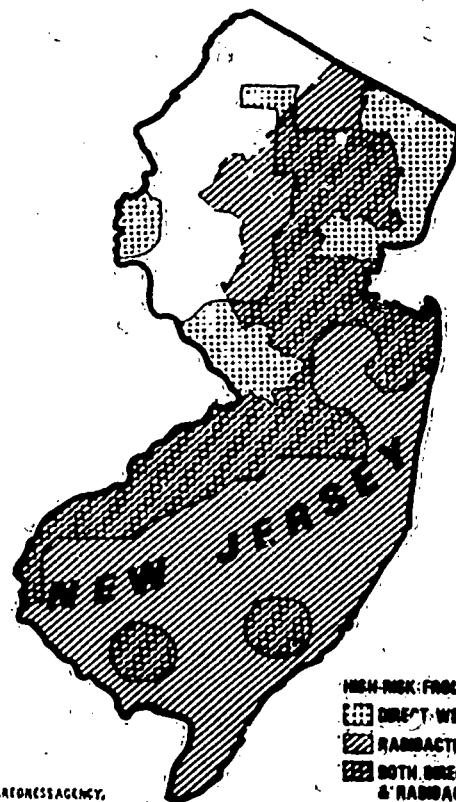
HIGH RISK AREAS

FOR CIVIL PREPAREDNESS NUCLEAR
DEFENSE PLANNING PURPOSES

COUNTIES OR PARTS OF COUNTIES	POPULATION AT RISK WITHIN COUNTY	TOTAL POPULATION AT RISK
URBANIZED AREAS		
ATLANTIC CITY		161,934
ATLANTIC CAPE MAY	122,842	
	11,174	
VINELAND MILLVILLE		73,579
CUMBERLAND	68,502	
ATLANTIC	3,283	
GLOUCESTER	1,487	
SALEM	307	
TRENTON		274,148
MERCER	232,122	
BUCKS PENNSYLVANIA	31,475	
BURLINGTON	10,551	

NON-URBANIZED AREAS

ATLANTIC	47,334
DUMONT	2,533
BURLINGTON	114,900
CAMDEN	18,599
CAPE MAY	48,380
CUMBERLAND	62,872
GLOUCESTER	62,522
HUNTERDON	18,788
MERCER	71,846
MIDDLESEX	34,172
MONMOUTH	99,888
MORRIS	80,223
OCEAN	156,284
PASSAIC	17,501
SALEM	38,446
STONE HESSETT	44,819
SUSSEX	23,788
WARREN	8,196



HIGH RISK FROM

☐ DIRECT WEAPONS EFFECTS

☐ RADIOACTIVE FALLOUT

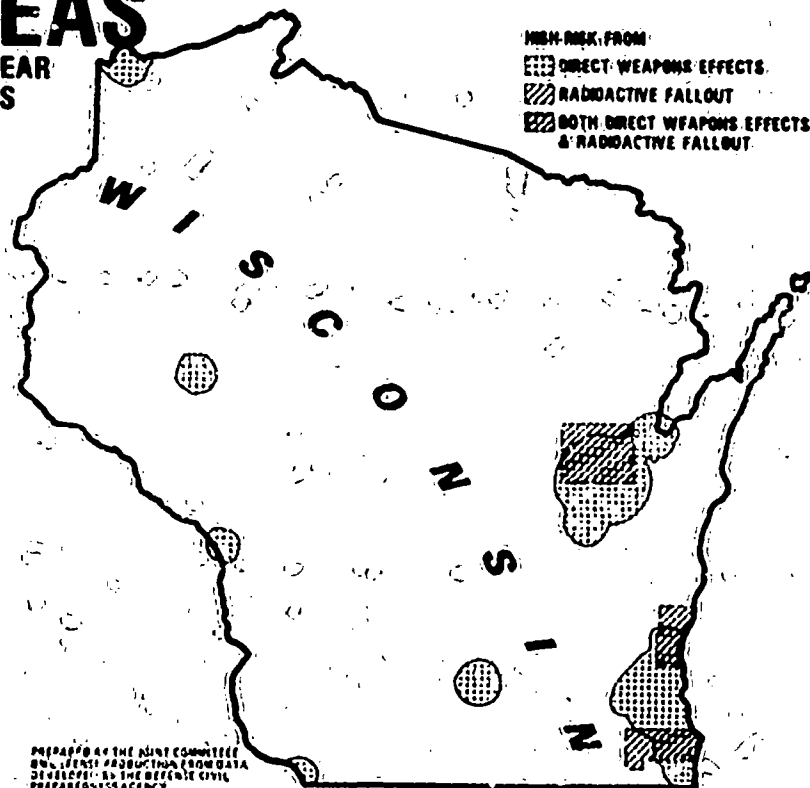
☐ BOTH DIRECT WEAPONS EFFECTS
& RADIOACTIVE FALLOUT

PREPARED BY THE JOINT COMMITTEE ON DEFENSE PRODUCTION FROM DATA DEVELOPED BY THE DEFENSE CIVIL PREPAREDNESS AGENCY.

HIGH RISK AREAS

FOR CIVIL PREPAREDNESS NUCLEAR
DEFENSE PLANNING PURPOSES

POPULATED AREAS (CITIES)	POPULATION ESTIMATED CAPACITY	TOTAL POPULATION AT RISK
URBANIZED AREAS		
GREEN BAY		129,105
BROWN	129,105	
MADISON		205,457
DANE	205,457	
KENOSHA		84,262
KEKONIA	84,262	
LACROSSE		63,373
LACROSSE	63,373	
HOUSTON	3,142	
MILWAUKEE		1,752,856
MILWAUKEE	1,752,856	
WAUKESHA	160,000	
OZAUKEE	27,000	
WASHINGTON	8,379	
RACINE	2,402	
APPLETON		129,032
OUTAGAMIE	80,511	
WINNEBAGO	45,417	
CALUMET	3,404	
RACINE		117,406
RACINE	117,406	
WINNEBAGO		55,480
WINNEBAGO	55,480	
NON-URBANIZED AREAS		
BROWN		18,618
CALUMET		13,848
CHIPPEWA		19,142
DANE		24,125
DOUGLAS		2,476
EAU CLAIRE		34,918
GRANT		1,030
KENOSHA		15,576
LACROSSE		6,424
OUTAGAMIE		36,346
OZAUKEE		26,443
RACINE		50,888
WASHINGTON		8,379
WAUKESHA		29,822
WAUPACA		15,215
WINNEBAGO		31,688



PREPARED BY THE JOINT COMMITTEE
ON DEFENSE PRODUCTION FROM DATA
DEVELOPED BY THE DEFENSE CIVIL
PREPAREDNESS AGENCY

These optimistic estimates assume every bomb or missile is on target, and there are no near-misses or far-misses, that is saying a lot for the reliability of Soviet weapons, they also assume very clean nuclear weapons. They further assume only military installations, as you have just said, and few critical and industrial areas are targeted. That puts a lot of faith in our hope about Soviet strategy.

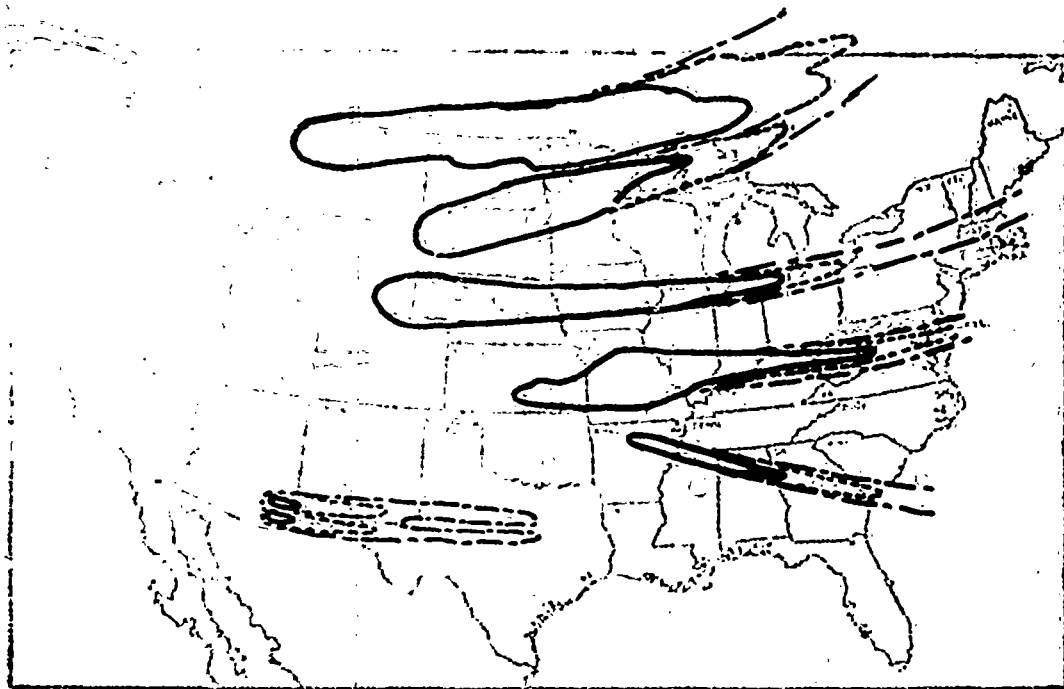
They seem to be optimistic about the effect on fallout and medical facilities, food supplies, and other emergency support services.

If these assumptions and estimates prove wrong, then an already bleak picture becomes darker still.

And you said that, Dr. Panofsky—correct me, if I am wrong—that this kind of attack, would cause 18 million deaths?

Dr. PANOFSKY. No, sir. No, sir. There would be very many more than 18 million deaths. The 18 million figure corresponded to attacking the Minuteman bases only. This particular model involves on an order of decreasing priorities many other military targets as well.

There is another matter about these charts. That is, it defines population at risk as being exposed to an overpressure of 2 pounds per square inch, or more. This is a region where a fair number of people will survive and a fair number of people will be killed, but it uses the 10,000 roentgen figure for the limit of fallout dose. Ten thousand roentgen is 20 times the "mean-lethal dose." If you use charts similar to these here, using not 10,000 roentgen contours, but 500 roentgen contours, which is the mean lethal dose, then the fallout pattern, rather than being little blotches as they are on these charts, become big ones, big plumes extending over many States. In fact, if you look at the committee print of the Foreign Relations Committee of September 1975, on page 51, there are corresponding patterns which give the 500 roentgen contours. If you compare those, say, from the Minuteman base in Montana—



FALLOUT CONTOURS FOR AN ATTACK ON U.S. ICBM SILOS

- 450 REM to a person with a protection factor of 3 (50% fatalities)
- 200 REM to a person with a protection factor of 3 (50% hospitalized)
- strontium-90 contamination exceeds 2 microcuries per square meter
(current ERDA standard for use of land for agriculture)

Senator PROXMIER. What page is that on?

Dr. PANOFKY. Page 51. In comparison to the charts here, then you have a more matching presentation between the fallout lethal threat relative to the threat from overpressure than the match given in these charts.

Senator PROXMIER. Well, then, you reinforce my point.

Dr. PANOFKY. I say these are optimistic charts.

Senator PROXMIER. Furthermore, it seems we may have embarked on a major shift in strategy without being sure of its impact in terms of life and property.

Mr. NITZE. I think the 500 roentgen, that Dr. Panofsky talked about, is the summed lifetime radiation.

Dr. PANOFKY. One month. You cut off at 1 month.

Mr. NITZE. If people get in a shelter and have the sort of protection factor which even a basement gives one, I think they could survive such a level.

Dr. GARWIN. These pictures are on page 51, because I provided them for the committee. They are drawn for 450 REM to a person already protected by a protection factor of 3, so that would give 50 percent fatalities. The larger dotted areas are 200 REM to a person with a protection factor of 3 and 50 percent of those people, would, if you can believe it, be hospitalized under normal circumstances, to attempt to insure their recovery. Of course, under these circumstances, it would be absolutely impossible to hospitalize any significant number of people. I don't know why there are no totals on these charts. I have been adding them up, and this chart of Texas, if you add up the population at risk, I get about 6 million people in Texas. In New Jersey I have added those up and I get about $1\frac{1}{2}$ million. With Wisconsin I get 2 million people and I don't know how many there are.

Senator PROXMIER. You say only 1 million for New Jersey? It looks to me offhand as though you have considerably more. That doesn't include the fact that a large part of the population is so close to Philadelphia and New York City, and this is kind of zeroed in.

Dr. GARWIN. I agree with you. I was only adding. I wasn't judging.

Senator PROXMIER. Before I call on Mr. Kahn, I would like to ask Mr. Kahn to respond to the argument made by Mr. Panofsky that it would be 18 million or far more than 18 million casualties.

Dr. PANOFKY. For a disabling attack.

Senator PROXMIER. Of the kind described here in the charts.

Mr. KAHN. Before I do that, let me set a context for the attack. The Soviet Union is striking the United States. They are very anxious for us not to strike back. Even if they have been evacuated, they don't want their cities destroyed. Those buildings in Moscow and Leningrad are important to them.

Now, imagine two Soviet planners. One says, "I want to maximize the military efficiency of the attack." But then, 18 million get killed or make it 50 million people. It improves my argument.

The second planner says, "We can take a 10 percent disadvantage and kill essentially nobody by fallout. Absolutely nobody and, therefore, we can hold all those people as hostages to increase the probability of good behavior by the United States."

Which planner is going to win that argument?

There is no question in my mind it will be the second military planner. Anybody that doesn't understand that, simply shouldn't be commenting on this kind of material.

Senator PROXMIRE. That still eliminates a lot of people.

Mr. KAHN. I agree with that; 95 percent.

Let me add just a little bit. I got first interested in these issues in the early fifties. At that time, there was an issue of tests in the Pacific Ocean. Now, at that time we believed that every time you tested a 1,000-megaton of fission product you gave 1,000 people bone cancer or leukemia who would not have gotten it. That is a big number. There were 3 billion people on the Earth at that point so there is 1 chance in 3 billion of getting bone cancer or leukemia, which is negligible, but it is 1,000 people, which is a lot of people. I argued that anybody who doesn't give both numbers is being misleading, perhaps dishonest. I found one person who was giving both numbers. The government always said 1 in 3 billion. The critics always used the number 1,000, which made it look big. Very few people can divide by 3 in their head. They don't know how to do it. This is the difference between half full and half-empty. I insist that any serious discussion should show how bad it can be and how good it can be without any remarks that the "good situation" is wishful thinking or not possible at all.

Senator PROXMIRE. Don't you think it is unlikely that the Soviets could possibly envision an atomic attack on the United States, that, as you say, would reduce by 15 percent their military effectiveness and in doing so, in order to minimize the effect on human life and maybe not kill 50 million, but kill a million or two million and not have an all-out devastating retaliation by this country? They know that.

Mr. KAHN. They don't know that.

Senator PROXMIRE. Well, I can't imagine a scenario. I can't imagine the President or Congress standing still for that, without immediate, terrific retaliation. Are we going to say we give in?

Mr. KAHN. No. There are other capabilities.

Senator PROXMIRE. What?

Mr. KAHN. The ability to destroy their military forces; increase bargaining or do something in return.

Senator PROXMIRE. You know that is going to escalate in a hurry.

Mr. KAHN. Can I ask you a question?

Senator PROXMIRE. Yes, sir.

Mr. KAHN. I had a meeting once in Chicago in 1960. There were four Congressmen present at that meeting. And 30 other people present. I gave the following scenario. The Soviets destroy New York City. Kill 6 million people. The American President says at this point we have to destroy the Soviet Union. He is told he can destroy 150 million Soviet citizens without any trouble, but he cannot destroy the Soviet Strategic forces. Furthermore, if he launches this attack the Soviets will retaliate and kill 180 million Americans.

Obviously he can do nothing at all or do something in between. Of the 34 people present, all 4 Congressmen thought the American President would authorize the destruction of 180 million Soviets and get 180 million Americans killed in return. Not another person present thought so. That interests me.

Senator PROXMIER. I don't think those are the only options, as you know. There are the retaliations that might be more limited to begin with, and the Soviet retaliation might be limited. These things are going to escalate fast. The strategic value and military value of destroying cities in the Soviet Union would be very great. We don't want to lose. They don't want to lose.

Mr. KAHN. I agree with the first part of your statement. There are other options. And we do have responsibility to America and to the world to try these other options. We will do something to the Soviet Union, but we will not do anything that makes the destruction of 200 million Americans inevitable. No American President is likely to do that, no matter what the provocation.

Dr. GARWIN. I think Mr. Kahn's argument would be more compelling if he had more familiarity with our writings of the past 5 years.

Mr. KAHN. I am very familiar with them.

Dr. GARWIN. Look at the presentation of the Defense Department, beginning on page 11 of the Senate Foreign Relations Committee Print, *Analysis of Effects of Limited Nuclear Warfare*, September 1975. What is important is the amount of military advantage that can be obtained from the strike you are proposing. Since we have such a small marginal benefit from the last part of our vast military force, (the last part and the first part have been made equivalent in the Minuteman forces; it is very homogeneous), it doesn't do much good for the Soviet Union to destroy 50 percent, 60 percent, 80 percent, so far as our capability to destroy the Soviet Union is concerned, we can do that with 10 percent of the Minuteman force. As I said earlier, that was the problem in the 1960's, when the Defense Department asked for the ABM system, saying without it, our deterrent would disappear.

Of course, they were talking only about the land-based component of the deterrent, but they neglected to tell you that the vast majority of Minutemen were not targeted against any industry and population at all. They were targeted against relatively low value, military targets, simply because in the process the important targets are assigned first, and then warheads do not go unassigned. If they have to be launched, they would be launched against military targets.

The first thing you do, when there is a threat to Minutemen, is to re-target. If you have enough information, you then re-target the remaining missiles against the remaining important targets. If you do not have information, you re-target them *all* against the important target complex. So that is why a reduction of 10 percent, (which was hypothesized by Mr. Kahn) in military effectiveness of the Soviet strike would not preserve the Soviet Union. The Soviet attack would use up excess missiles, missiles which were built to penetrate ABM systems, and which were then assigned to military targets of very little value.

Now, I will give you not a probable conversation between a military planner and a civilian leader but one that is more probable than the one proposed by the Defense Department. The scenario that the Defense Department has advanced at times goes that the Soviet Union destroys all the Minutemen and then they say to the United States, "Surrender, we hardly killed anybody."

This was in the days of Secretary Schlesinger's estimate of 50,000 fatalities or 800,000 fatalities and the President of the United States seeing he has no Minutemen left, somehow chooses to surrender.

This scenario ignores the fact that the vast number of our warheads are on the Poseidon force and not in the Minuteman, and our military capability is in fact little affected if one ranks all the targets in value. But the prelude is completely unnecessary. The Soviet Union could say, without destroying Minuteman, "Look here, Mr. President, surrender or we will destroy American cities."

It wasn't necessary to destroy Minuteman in order to say that. The compelling nature of the argument would be just the same. The President has all the options left in the first case, as he has in the second.

They could launch some weapons at some cities, and then say, "Now you see what nuclear weapons will do to your population, why should we waste them on our military forces? When you surrender, why don't you give us those military forces? But we mean business; we are implacable and if you fire back, we will destroy all of you."

And the question is, as Mr. Kahn knows, who believes what? What is inevitable in this system? That is the problem with the questioning which began with President Nixon in 1970, where he belittled our existing military capability, (in my opinion, much to the detriment of the U.S. position in regard to its allies and neutrals), by pretending that he had no options between the total destruction of the Soviet Union, which would not do us any good, and doing nothing. In part, he had a whole array of intermediate options, and he chose instead to ask, "Should a President destroy the Soviet Union, with the certainty that the United States will be destroyed in return?"

The Defense Department leaped in to suggest all kinds of weapons programs to fill this gap which did not exist.

Mr. KAHN. The question we are asking, would you groundburst a lot of weapons against the Minuteman, answers itself. If you can be destroyed by the surviving Polaris then you have a strong motivation not to guarantee such destruction by destroying a lot of U.S. cities. Your only chance is to be able to deter such response.

The point is, if there is an attack on Minuteman, it probably will be airburst to minimize collateral damage. What I am talking about is probably 10 percent more Minutemen surviving. It makes every sense to accept this cost if it can increase the attacker's chance of deterring an attack against his cities.

Dr. GARWIN. There is no effective attack which uses airburst against Minuteman. Nothing they can be confident of.

Mr. KAHN. Within 200 or 250 feet. Even if you go up to 500 feet, you don't lose that much. But I have not done these calculations recently.

Dr. GARWIN. No, the Minuteman is harder than in the old days.

Senator PROXMIRE. Let me get into some specific questions now and we can come back to this a little later.

Mr. KAHN. Could I make one more comment?

It is very clear, I think, that if necessary, we might in desperation go to *lex talionis*, to tit for tat. Every primitive legal code tells you about this.

We have gotten today, in our discussion here, into what is often called controlled response on limited strategic war. I don't think the pro-

professional planners a summer than us. They will often invent controlled response even if there are sharp gaps occasionally between the Department of Defense's current public verbal policies and its real, in the event, action policies. The Department of Defense is a very large organization and the right hand doesn't know what the left hand is doing, and sometimes neither knows what the head is doing. Further it is very difficult to discuss these bizarre possibilities in public.

I have seen this elsewhere in the world. I would argue the biggest single problem we have is that the Department of Defense is not clear. It itself doesn't understand its own plan. These issues go back to 1960, and they still don't understand them.

Senator PROXMIRE. Now, let me ask you, Mr. Nitze—incidentally, I want to say we are very grateful to you for giving us the benefit of your lifelong experience in military planning and doing it on such short notice.

You note in your *Foreign Affairs* article of last January that a more active civil defense program does not appear to be politically possible at this time. Do you believe that a more active program is nevertheless necessary? And if so, what would it include, I should say, and what is the cost? [For complete article, see Appendix II, p. 83]

Mr. NITZE. My point is, a civil defense program, to be effective, does require public support. In the first place, it would have to get congressional support to be authorized. I don't believe that one should justify a program by overstating the threat. I think one ought to be very precise in everything that one says about this very important question.

Senator PROXMIRE. Well, I think maybe we can make a beginning on that, sir, by finding out what the cost is and what you think it would include.

Mr. NITZE. Therefore, I think it is very important to be precise in what I am talking about.

I am amazed by the imprecision of what has been said here today. For instance, one can readily compute what kind of accuracy the Soviets need to have, and how they would have to attack the Minuteman and the other principal strategic counterforce targets in the United States in order to keep the casualties lower than what Dr. Panofsky was talking about. I really don't think they are going to attack Minuteman unless their accuracy, CEP, gets to at least the 0.15 nautical mile level. At 0.15 CEP or lower, I think it is possible to minimize the fallout.

Certainly if you get down to 0.1, it is easy to limit the fallout from such an attack. I think it is essential to keep all one's figures on a consistent basis so that your committee can have some logical approach.

Senator PROXMIRE. What we want to settle on is this committee's concern with civil defense. That is our problem. That is our responsibility. I would like to get your recommendations on that. What should it include and what would the cost be?

Mr. NITZE. I would agree with Herman Kahn's estimate that a \$300 or \$400 million program is about as large a program as could be optimally implemented at this time. At some later time we might want to get ourselves in a position such that we could implement a more effective program. You should be able to do a lot with \$300 million.

Senator PROXMIRE. What did you have in mind? What would that include, sir?

Mr. NITZE. Well, I think the major immediate factor is one of planning, organization, and of training. I haven't worked at civil defense in detail in recent years, so I do not know exactly what a given program would do, but you asked me what order of magnitude. I think \$300 million would cover a program which is not restricted just to planning. I think you also need to do some physical things which have a payoff.

Senator PROXMIER. Now in your *Foreign Affairs* article, you say that the Soviet Union's civil defense program is nearly as destabilizing to the nuclear balance as the Soviet ABM system. Now, does that mean that an augmented American civil defense effort would further increase nuclear instability? [Appendix II, p. 99.]

Mr. NITZE. No. I am saying that the situation in this regard has already been destabilized or has the potential of becoming destabilized by what the Soviets are doing.

As Dick Garwin pointed out, in the event of attack most of our remaining warheads would be Poseidon warheads, which as I said in my testimony have in fact less than twice the equivalent megatonnage of the Hiroshima and Nagasaki bombs. He suggests that they not be fused at the optimum height of burst.

This suggests that they be groundburst, or close to that, in which case the area of blast damage would be greatly reduced and as Garwin has said the fallout from small yield weapons is not great relative to larger yield weapons.

Let me just continue. If you analyze that kind of an attack against Soviet targets and assume the Soviets really carry out something approaching what is in their civil defense manuals, the Soviets' casualties from such an attack would in fact be low.

Senator PROXMIER. Are you saying that the Soviet civil defense system was destabilizing, but if we engage in a civil defense effort which would be three or four times as big as it is now, it would not be destabilizing. Isn't that inconsistent?

Mr. NITZE. It isn't, because two problems are involved. One is the situation as looked at by a "Man from Mars" viewing both sides of the instability.

The other is the position we would be in, if viewed from the point of view of an America who did not want to surrender, or wanted to face up to the possibility of the threats that Herman Kahn was talking about. You have to consider the defense of the United States.

From the standpoint of the defense of the United States and the effectiveness of our deterrent, it does make a difference if the Soviets have an active civil defense program and we do not. I agree that we don't know too much about that program today, but we know the priorities. And the priority they are putting on civil defense is much higher than the priority we are putting on it.

Senator PROXMIER. Why wouldn't the Soviets say that a civil defense program of greater proportions in this country, represented, in effect, the same kind of destabilization from their standpoint?

Mr. NITZE. If only one side worries about these questions, for instance, if we forego a civil defense program, and the Soviets do not, you then end up in a situation where one side has a clearly dominant position in the event of a crisis. I do not think that any American wants to see the United States get itself in a position where the United

States has foregone everything that can possibly cause an action-reaction situation, but the Soviets have gone forward with each of these programs, such as the program to be able to threaten even Minuteman and we forego a program which would give us an equivalent capability or even forego programs which would increase the survivability of our Minutemen.

Senator PROXMIER. I can see some logic in that. Let me ask Dr. Panofsky to respond.

Dr. PANOFSKY. I have some difficulty in accepting the argument that if the Soviets are engaging in a program, this will give us in some way an inferiority unless we do the same thing. We may even believe that their program is not even serving their own interests particularly well. I mean traditionally the Soviet Union has spent a very much larger fraction of its total strategic resources on defense, rather than offense. They have a larger ratio of air defense to air defense despite the fact they have no ABM under the SALT Treaty, nevertheless, they are maintaining a very large air defense capability.

Senator PROXMIER. Isn't it true, as has been said by Mr. Nitze, that the Soviet Union does have an advantage in civil defense? It is distinct and clear, and everybody admits it is an advantage.

Why would it be—why would it not be wise at least for us to move somewhat? They have a bigger defense program than he advocates. Why would it be destabilizing if we only move part way in that direction in order to provide better safety for American citizens?

You haven't challenged his figures. He said they spend about \$1 billion a year. We spend \$80 million. They spend 12 times as much.

Dr. PANOFSKY. They are giving priority to it, but I am not saying they are spending their money wisely in that respect. I see no reason why if they spend their money unwisely that we should imitate that. In general, this tit-for-tat planning that one good mistake should be matched by another—this kind of responding, is not a good way.

There are dissimilarities between the two countries. There are dissimilarities in the ways the two countries define their priorities.

The surest way to have an arms race is when each side points to the other in an area where the opponent is giving higher priority. Each side therefore, says that the opponent has an advantage.

It is the line of reasoning that bothers me. I do believe that civil defense does contribute to the arms race on both sides, and also I believe a small civil defense program is very cost-effective. A larger civil defense program progressively becomes less cost-effective.

Senator PROXMIER. Let me ask Mr. Nitze also. You point out that the Soviet Union has a program of trying to disperse most of its industry, three-quarters of its industry, to small and medium-sized towns so as to make it less vulnerable to nuclear attack. We have the same kind of program in the law, at least the planning in that direction, we have done very little with it. Do you think we ought to give more serious attention to the dispersion response, to the prospective nuclear attack, so that we would be able to defend ourselves better?

Mr. NITZE. I would put first priority on having a greater percentage of our population survive. I would put second priority on the question of the survivability of the critical components of our industrial base. I would also like to comment on what Dr. Panofsky said.

The major premise of his statement was that the Soviet Union was wasting its money and was stupid in the question of the civil defense program. I doubt that it is stupid on their part. I think it is wise on their part, from their standpoint. He also suggests that just because they do a stupid thing we should not do a stupid thing ourselves.

I wholly agree with that. But the major premise of that is that what they are doing is stupid from their standpoint. There can be differences of judgment as to that.

The third point is that he suggests that we have been right in concentrating almost entirely on offensive systems and putting very low priority on defensive systems. On this my judgment differs from his.

I think the Russians and Clausewitz are quite right to say that just to concentrate on the offense or just to concentrate on the defense is strategically unsound, that one has to pay attention to both. It is not necessarily true, however, that the right response to a given problem is for the Soviet Union and for us to take identical actions.

Dr. Garwin is quite right in suggesting with respect to the increasing accuracy of the SS 18's and the SS 19's, et cetera, that the immediate response we ought to take is to go to a mobile basing system or multiple launch point system.

There are further questions involved. What I think is necessary, is that we maintain high quality strategic deterrence so as not to tempt the Russians, in a crisis, to challenge us in this field.

I think this is wholly possible. But I think it takes serious attention and timely action.

I don't think it is appropriate for Dick Garwin, for instance, to suggest that those who are interested in this province are interested primarily to increase the Defense budget or to waste money.

I think this is an unworthy line of attack.

I now have little or nothing to do with the Defense Department, but I have in the past. I resent having Dick Garwin suggest that my interest or that of others trying to manage our defense program is to increase the expenditures, to increase programs. It is not. Every effort is made to assure that programs are justified on their merits. They are either necessary and cost-effective or not. This is a legitimate area for disagreement and debate. Programs either contribute to the avoidance of the risk of war, and contribute to the security of the United States, or they don't. Of course, the domestic economic situation must bear on how much is done now and how much somewhat later.

I further disagree with Dr. Panofsky's rebuttal to my *Foreign Affairs* article, in which he says it would be an abomination to the world if the United States were today to have a relative nuclear capability comparable to what it had at the time of the Cuban Missile Crisis.

I do not think the United States is the enemy. The enemy is a different enemy. If we want to preserve the chance for peace in a decent world, we have got to go at this without the kind of an approach which appears to assume that the principal enemy is the Defense Department or those who think we ought to have an adequate security.

Senator PROXMIRE. Before I call on Dr. Garwin, I am sure all of us agree we completely respect the views of everybody speaking. You all

Speak sincerely, you all have respect for each other. I think we should maintain that view.

I would like to ask Dr. Garwin to comment on Mr. Nitze's point that we seem to be neglecting the defensive aspect of our military effort, stressing the offensive part. It's an imbalanced kind of situation whereas the Soviet Union seems to have a more balanced emphasis on both.

Dr. GARWIN. Let me first say, in speaking, the record will show I said nothing about Mr. Nitze's motives, and I quoted really from the Secretary of Defense and the President in that spending money is good; we must match the budget. I talk about programs. They talk about money. I agreed with Mr. Nitze that this is the wrong approach and that is why the Defense Department and the Nation are in a perilous state, where we consider these totals, and not the contribution to the security.

The choice between defensive and offensive forces is a matter of utility. And Clausewitz understood this very well. What we could not understand is the relative utility. The utility of additions to our offensive force at present, I think, is very small, and that is why I have opposed the Trident program, which adds forces we don't need.

That is why I have noted in response to criticisms in the last few years of Soviet advantage over our forces, I have supported the possibility of increasing the Minuteman payload by a factor of 4.

But those who have most publicly criticized throw-weight imbalances have never proposed, have never agreed with such a program. Defensive forces, if they were useful, would command a substantial fraction of our budget. It used to be that the Soviet Union was spending about \$7 billion a year in air defense at a time when we were spending a billion and a half in air defense, but our bomber threat to them was much more important than their bomber threat to us. Our air defense system in fact, never could have shot down more than a rather small fraction, perhaps 20 to 30 percent of the Soviet bombers, when one considers the actualities of war and, the predictions for the system.

We wisely reduced the expenditure, thereby increasing the imbalance between offensive and defensive expenditures on our side, but freeing money which could better be used in the general purpose forces and improving the penetrability, in hardening the Minuteman silos, in buying more range for Poseidon, in going to the Trident I missile 4,000-mile range. That was a better use for that money. It's not just a matter of adding up the total and authorizing the larger figure.

Now, when one talks about how many people will be saved by civil defense, I submit we have no study of how the Soviet Union will recover after a major attack by the United States on its cities. The Soviet Union has trouble feeding its people in peacetime. It has trouble housing its people. It may be that after such an attack, people will survive and emerge from the shelters, but what will they do then?

There are similarly no studies that I know of for this country as to what will happen following these 18 million or 20 million fatalities, that is, during the one month when people die from radiation sickness. They emerge from the shelters, they need to be fed, they need to be housed, production has to be restored. Before we make decisions like this, as to whether it's useful to spend money—

Senator PROXMIRE. Of course, these are merely assumptions. You see, an exchange of this kind could result in this kind of a low casualty

situation, but if it goes on and on and on—as many say it might, and it might, because we can't predict what will happen—then, obviously, you do have a high casualty situation where it's just academic as to whether or not the remaining 190 million Americans, or 100 and to 200 million Russians could recover. Isn't it likely, or isn't it at least strongly possible that, after an initial attack, there would continue to be exchanges? Are you going to have a situation where we exchange only a single nuclear attack with the Soviet Union? Each attack each other and that is it? Stop there, somehow?

Dr. GARWIN. It's hard to see how.

Senator PROXMIER. It's hard for me to see how we would end up short—Mr. Kahn has very eloquently made the case better than anybody else I know of that war does not necessarily lead to the theoretical ultimately total violence, but I think because of the enormous violence of the nuclear weapons, now, that there would be a very strong possibility, perhaps a probability that it would.

At any rate, you are talking about a test case when you say we do not know how these people who would survive, even though they might constitute a majority of Americans and Russians, how they would then be able to get along.

Dr. GARWIN. I am saving of the \$80 million present civil defense budget or the \$300 million advocated or the \$100 million defense budget, some little amount of that ought to be spent now on illuminating what will happen to this population after they emerge on the two sides, before we choose to expand civil defense.

I know that last year, the number of expected fatalities in the Defense Department's scenario of a strike on our offensive forces moved within months from 800,000 to the many millions.

I think it highly likely that our understanding of the utility of civil defense on the two sides is as far from the mark as was that estimate.

Senator PROXMIER. May I ask Mr. Nitze, the recommendations in your *Foreign Affairs* article endorse increases in the strategic budget in the civil defense area, and so forth, if it becomes politically feasible. You seem very pessimistic about the potential of arms control negotiations, on which many others have relied as our principal effort toward achieving peace. What changes in the strategic environment lead you to believe that arms control won't work and that we are now going to face a real missile gap?

Mr. NITZE. I spent 5 years as part of these negotiations. We did our level best to get the most effective arms control agreements we could. One thing which has emerged, for better or worse, out of those negotiations is, the ABM treaty which I still believe is a worthwhile treaty, and was a significant accomplishment.

I would point out, however, that the crucial point in the ABM treaty is the definition of testing in an ABM mode. The radars, interceptors, and launchers to which the limits in the treaty are to apply largely depend on that definition. That definition is contained in an unilateral statement by the United States. We have had poor experience with such unilateral statements in the past.

So there is an important gray area, an area which is not wholly reliable, within the ABM treaty. However, I still think we did the best we could, and that the treaty is valuable insurance. But it's not perfect insurance.

Senator PROXMIER. Do you believe negotiations are breaking down, slowing down?

Mr. NITZE. The Vladivostok accord does not restrict the Soviet Union from deploying the full panoply of S-17's, S-18's, and S-19's, which they are now deploying, nor does it give assurance that they will not continue to modify, replace, and improve those systems, nor does it give any hope that the Minuteman force will not in time become vulnerable.

Jan Lodol, in commenting on my *Foreign Affairs* article, gives projections which predict high accuracies, even earlier than probable. He says there is nothing you can do about it. I agree with him that it is very hard to see how you can control improvements in accuracy. It is a serious problem. I agree, however, that Soviet accuracy will probably improve over time to .15 or .1 n.mi., in that general range. It's primarily a question of when they will have such capability.

Clearly, the Minuteman force will then be vulnerable and unless we do something about it in time clearly there would then be a problem as to what would happen if there were an attack, a counterforce attack on United States deterrent forces. Then there could be a great imbalance between the residual forces remaining to the two sides. If that is further complicated by an asymmetry in civil defense, then it would seem to me the United States could be in a position where it would have very few, if any, nondisastrous options left.

I believe that the situation can be avoided, and should be avoided, that the American people want it to be avoided. They would be thoroughly upset with a Congress that hadn't carefully considered and acted on the problem. I believe it takes very careful and precise thought to figure out what we should be doing in order to preserve a position in which the United States cannot be humiliated in the future.

Senator PROXMIER. What do you see as the next logical step or is there another step in trying to achieve strategic arms limitations?

Mr. NITZE. I would hope that the Vladivostok accord could be implemented, by an agreement that does not cut off our possibilities for countering what is permitted under the Vladivostok accord, to the Soviet Union. Apparently it's proving difficult to do that. I am not aware of the day-to-day negotiations, what is going on, but it seems to me that they are running into real difficulties in getting that accomplished.

Let's presume they do get it accomplished. Then the next possibility to do something about strategically useful arms control would be the "SALT III" negotiations. Now, I have a hard time believing that one can really get an improvement in the strategic situation through SALT III, unless the United States has first demonstrated that it takes seriously the evolving nuclear relationship and that it's not going to let itself get itself into a position where it could be humiliated.

Senator PROXMIER. I would like to ask you, Mr. Kahn, this committee has a defense mobilization responsibility. I think you and your colleagues have done a great deal of most constructive and helpful work on mobilization operations. But I am curious to know why you believe the mobilization warfare you describe is likely to become the standard mode of nuclear conflict between the United States and the Soviet Union.

What leads you to that conclusion?

Mr. KAHN. To the point that has already been made. If you look at rational, sane people and I don't mean very "rational" or very "sane." These people are not totally insane. They have enough rationality not to walk out of a five-story window or, as the Supreme Court once said, to get out of the way of a moving locomotive. That kind of rationality. That leads one to avoid destroying 20 million or 50 million Americans because they may then get destroyed back. I agree with that point. Already, that problem has been settled.

Now, what is the next problem? People say you can't rely on the Defense Establishment. These are speculative statements. You need both. I happen to think the real danger is not the United States-Soviet conflict but other issues. We think at least 10 Third World nations have programs in nuclear weapons. I don't think that destroys the world, but it doesn't make me comfortable. If I have to look at the United States-Soviet conflict, I would repeat, the model I would have would be World War II with 7 months of phony war.

People say they can't believe in restrictions. Any war in history in which both sides have retaliatory capability, you will find both sides restricted.

We had restrictions in Vietnam. You couldn't bomb Hanoi, but you could bomb the suburbs. You couldn't bomb the canals but you could the road. You have hot pursuit over Laos but not over Hanoi.

These issues are very complex. They came up very fast and everybody understood them. I don't like to make the point that the remote possibility is that we will not escalate. I only have to make the case that there is a small probability that people will be restrained.

The thing which strains belief is not that there won't be but there will be escalation. That both sides have a suicidal complex and insist on destroying each other's cities. One of my staff members has an acronym MAD for "mutual assured destruction." I think there is something to that. People don't get up in the morning and say, "Should I commit suicide today?"

The other point I would like to make is that the important arms control tends to be not the negotiated agreements but the understanding of both sides.

In the beginning of *On Thermonuclear War* the only mistakes I made, I assumed a much bigger arms race than occurred. We assumed by 1975 there would be 20 nuclear nations. There are only six. We assumed budgets like 10 times the current budget. If you look at the current budget, it is about half again what it was 30 years ago. It's very small, despite escalating costs. You want to be careful not to upset these implicit arrangements.

I would agree with Dick Garwin that civil defense programs do restrain it some. I also agree with Dick Garwin on the price comparison. If I take a military point of view, the proper answer to their civil defense program is much bigger offense. But if I look at a bargaining situation, the proper answer is more civil defense.

The same way, if you have a bargaining situation, Paul made the comment over and over again, we don't want humiliation. I would argue, in the current military establishment, for an increased possibility of appeasement in a serious confrontation.

That's what concerns me. Not surrender.

Senator PROXMIER. Dr. Garwin, I believe that the former Defense Secretary McNamara became disenchanted with defensive weapons systems in part because they fail the cost-effectiveness test. That is, for every million dollars you invested an adversary could overcome it with a smaller investment. Strategically, the offense would always overwhelm the defense at relatively less cost.

In the first place, do you think that principle was sound and if it was sound then, do you see any reason to modify that principle now or does it still apply to active missiles?

Dr. GARWIN. Well, that's not a principle. I think it's a result. It was fact then, and it is a fact now, in my estimation, as regards the use of ballistic missiles against cities, against Soviet targets.

Senator PROXMIER. Does the same argument hold with respect to civil defense?

Dr. GARWIN. The same argument now holds with respect to civil defense at modest levels of attacking forces. To add to the offense to maintain the same level of destruction now, when most of the offensive forces are not targeted against cities anyhow, makes very little sense.

Senator PROXMIER. How about the enormous increase in technology, in both the delivery systems and the megatonnage and so forth? Is that a factor or is it not a factor?

Dr. GARWIN. Between active defense and ICBM attack the advantage has remained on the side of the ICBM. Nothing in technology has helped there (as concerns the attack on cities). But there have been differences. There has always been the possibility for defending those very special targets which are Minuteman silos, because they are numerous and so homogeneous and so hard, that the attacking warhead would have to come very close in order to destroy it.

Senator PROXMIER. I want to get back to the point that if we did spend substantial sums on the civil defense program, could an adversary spending less simply improve their missile system so they could overcome whatever defense, civil defense, we established?

Dr. GARWIN. For a small amount, it's not clear. They could by spending a reasonable sum overcome the small benefit one would get from that civil defense program. What you are asking is really a very technical question as to the marginal benefit of civil defense versus increased offense and it depends very much on the intentions on both sides.

When you optimize both, you might come out with some benefit if an exchange took place. But that's not the only point. The point is the question of risk, of increasing or decreasing the probability of war. I think really that's what all of us are concerned with here, as much as how many people would really be saved, if war broke out.

Mr. Nitze has talked about that and Mr. Kahn about appeasement. That is not a matter of how many people are being killed in an actual war. That is what happens because of the capabilities which we have or which other people think we have, and how the tension unfolds. So you are asking a question to which I don't know the precise answer, but it's probably not a major part of the evaluation in any case.

Senator PROXMIER. Mr. Nitze?

Mr. NITZE. I don't know the precise answer either, but I am confident that it would not be possible for the Soviets to add an offensive ca-

pability on top of what you can see the Soviets are now building, which would be nearly as cost-effective as our present civil defense budget.

I am sure that with an expenditure of \$300 million a year—

Senator PROXMIER. What do you get for the \$300 million? Do you really get a civil defense program? Don't you get planning, perhaps?

Mr. NITZE. I think you get more than that. If people were really to go in their basements for instance—a typical basement gives one a protection factor of about 25. You can figure what the reduction in fallout casualties would be if you go up from a protection factor of 3 to 6 to 25 for the population.

Senator PROXMIER. Why do you need a multi-million dollar a year program to get people to go into their basements?

Mr. NITZE. You need organization, leadership.

Senator PROXMIER. Don't we have that program now?

Mr. NITZE. I don't believe we do.

Senator PROXMIER. Don't we have a situation in which we turn the radio to a certain frequency and we are told to go to the basement, whatever?

Mr. NITZE. This is what a major factor in the disagreements concerning estimates is about: What percentage of people would in fact avail themselves of the shelters that are available? That figure, given today's civil defense programs, is estimated to be very low. I think one could increase that by a substantial factor if one only had an effective organization and program.

Dr. PANOFSKY. There is more to it than going into your basement. In order for the basement to be useful, it has to be stocked with supplies and so forth, in addition to the individual having to know what the radiation levels are.

I believe with Mr. Nitze there is more to it than the availability of the basement.

Senator PROXMIER. You feel the \$300 million, if spent, could be cost-effective?

Dr. PANOFSKY. No, I do not. I have no idea. What Mr. Nitze has in mind very specifically as to what would be bought for the \$300 million—

Senator PROXMIER. That is one thing we should be able to achieve. We should get a study of that.

Dr. PANOFSKY. But a primary question is whether the opponent could negate the expenditure of a given amount of money for civil defense, by escalating offense? That depends very much on the situation. If he targeted specifically, against those populations who employ civil defense, if he explicitly intended a population attack, then I believe that a civil defense program becomes cost-ineffective, if it is intended to hold casualties down to a moderate level.

If you look at the exchange ratios for various numbers of survivors, it always turns out that it favors offense if the number of survivors is to be held to within a reasonable limit.

If you are trying to save incremental population, then civil defense gets to be more cost-effective, but in that case you may ask the question whether that picture is one you want to prepare for.

Senator PROXMIER. Dr. Garwin, your testimony raises the fundamental issue; that is, the possibility that the military preparedness

is so costly. We are spending \$113 billion and it seems the Congress is going to go along with the President in full, as far as what he asked. You say that we couldn't devote adequate resources to civil defense preparedness if we wanted to.

I am in accord with your view that the management of our defense dollar is far from what it should be. There is fat we can cut out. There are aspects of your statement that I find troublesome. You say civil defense should be treated as a side issue. Wouldn't you say defense of civilian lives and property and institutions is the paramount concern of our military forces and programs? Do you have an opinion as to when the doctrine of more limited life-saving is more important?

Really what I am getting at, it would seem, as I tried to say in my opening remarks, the fundamental responsibility of any government is to protect its people. For us to provide no civil defense, no civil defense programs, and to treat it as a side issue would seem to walk away from the fundamental responsibility of the Government. How do you answer that?

Dr. GARWIN. I am as interested in life-saving as anyone else. The question is, what is the most effective way to spend money and to have programs from which to derive it? I do not think a standard civil defense program preparing for a large-scale war with the Soviet Union is going to do very much good. I think we would be better off rationalizing our defense posture.

Senator PROXMIRE. Let me interrupt to ask you to lay that aside for a moment and take what Mr. Kahn pointed out as another responsibility, perhaps a more realistic or likely possibility.

Supposing some of those countries that have nuclear weapons for one reason or another use them, or there is a terrorist attack of some kind, that is a real possibility as we know. Under those circumstances, wouldn't some sort of a limited civil defense program make sense?

Dr. GARWIN. No. These would be small weapons. The fallout from small weapons is not nearly as bad as from large yield weapons. It is the local effect which dominates in the small weapon case. There are things that should be done to prepare against natural disasters, or in case there is an accident involving a nuclear reactor. Substantial benefit can be obtained at very low cost by preparing to distribute common iodine pills to block radioactive iodine uptake.

But what is important is to reduce the risk of war. To reduce the destruction, and civil defense, as it stands, and by the arguments which are being advanced for it, and with a degree of planning which appears to have been done and presented to the Congress, is not going to help significantly.

There are ways in which one saves lots of money. In fact, one can afford a larger civil defense budget within the existing defense budget whether you added the money or got it somewhere else.

Senator PROXMIRE. Would you favor that?

Dr. GARWIN. No.

Senator PROXMIRE. You would not. Even if we reduced the military budget, you wouldn't favor taking just \$500 million, which both Mr. Nitze and Mr. Kahn have suggested would be a tiny fraction, of course, of the budget, it would be less than a third of 1 percent—you wouldn't even devote that much to civil defense!

Dr. GARWIN. I would not. Unless there were a much more compelling case made. Not on the basis of principle and theory, but by considering a concrete program, not just this year, but for five years.

And its interaction with our offensive forces and how it would affect the post-attack recovery on both sides. Otherwise what we will see is just what you see here—because the Russians have put a Colonel General in charge, that is the real fact that people look at and say, "They have greater emphasis on civil defense than was formerly the case."

Well, if we have looked at the program and expanded it to \$300 million or \$1 billion a year, the Russians, or those who are interested in maximizing their offensive capability or their defense capability, can point to us and say, "See what greater advantage it gives the United States in striking first and being able to shelter its people. Now we have to do something."

It is far better to go in the other direction and ask what is necessary for our security. What, by proper resolve and potential use of our weapon systems, we can do to avoid humiliation, appeasement, and so on, and to keep these things from happening.

The greater the desire for flexibility, for destroying all the Soviet silos, the farther you fall from having that capability. If you insist on having it, you are always patching up the forces, making it possible to kid yourself that you are going to be able to do it. These capabilities are not necessary to keep the Soviet Union from attacking the United States. All that is necessary is to insure they will lose more than they will gain by doing so, and that requires a very modest force. It doesn't require civil defense on our side.

Senator PROXMIER. So you say, number one, as far as the prospect of a nuclear exchange with the Soviet Union is concerned, there is no need for spending any more on civil defense.

Dr. GARWIN. No more than the present.

Senator PROXMIER. As far as the other prospect of an accidental exchange or some kind of exchange initiated by some other country, civil defense again would not be required?

Dr. GARWIN. That's right. I really regret the decision to remove the nonmilitary part of defense preparedness, the dual nature of the capability which was protecting against natural disasters or industrial accidents, and to expect that cities and states, local authorities are going to handle that.

I think that was one of the better parts of our national program, and I value the existing program substantially less highly as a consequence.

Senator PROXMIER. Dr. Panofsky, I just have a few more questions. I appreciate the patience of all you gentlemen.

I would like to ask you, Dr. Panofsky, about a major difference in your testimony as contrasted with Mr. Nitze's article. He points out, because of a future Soviet throw-weight advantage, that the Soviets could retain a decisive superiority over the United States after an initial nuclear exchange or a series of low-level exchanges. This superiority would permit them to dictate terms to the United States or blackmail us into giving them concessions somewhere in the world. Now, you questioned the assumption that the Soviets would adopt a counterforce strategy, but you do not address this problem of exchange ratios that appear to favor the Soviet Union. Can you tell us why you don't consider those exchange ratios significant?

Dr. PANOFSKY. First, the kind of scenario which is being envisioned here, which is a first exchange with a residual advantage on the Soviet side, I do not consider to be a reasonable strategy for the Soviets to adopt. The question has never been answered properly, why would the Soviets do that? If they believe they have the advantage so they can threaten us, why can't they do it before causing the death of millions of Americans? Why should they risk all-out retaliation?

Senator PROXMIER. Let's get away from that logic. Let me get into the point of the effect on our allies for instance. There is a very strong feeling, I think, on the part of many people in the Congress and the American public that it is wrong for us to have an inferiority in both throw-weights and the number of delivery systems.

Dr. PANOFSKY. In addition to that I simply do not believe that the inferiority exists.

Senator PROXMIER. You say accuracy and greater yield is more important.

Dr. PANOFSKY. One of the problems with this debate is the following: Different participants in the strategic debate are focusing on different key numbers. If you wish, it is a matter of priorities. Those tend to become philosophies. In fact we are superior here and they are superior there.

If we emphasize the throw-weights of missiles where the Soviets are superior, we automatically project an image to our allies that the Soviets are superior. If, on the other hand, we would count the number of warheads, then we are superior. If we count accuracy, we are superior. If we count the penetration aids on our bombers, we are superior.

We are not symmetrical. So to compare the Soviet Union's overall strategic position with our strategic position—we have to take into account a lot of things.

Senator PROXMIER. We are not symmetrical, but would you say roughly we have a capability equivalent to theirs?

Dr. PANOFSKY. Roughly equivalent to theirs, but again that is an oversimplifying statement. Both sides have the capability to survive a first strike by the other and have enormous destructive capacity left in which they can destroy both military targets and residual population. Therefore to say that we are in major danger, because we focus on surviving throw-weight after a first attack as the index of being able to blackmail the other, in my view is simply underestimating our potential and underrating us unnecessarily in the view of our allies.

Senator PROXMIER. Now, Dr. Panofsky, you point out, and I think you are correct in doing so, that a shelter program would be very costly and would still not be effective for much of the population. Nevertheless, in the event of a nuclear conflict—which you say would lead to an all out nuclear conflict— isn't it true that a shelter program would provide life for millions of Americans who otherwise would perish? And if that is the case, even though the prospects of a nuclear war are remote, maybe 1 percent or less, in the reasonable future, maybe much more than that, we don't know what they are, but say a minimum of 1 percent, then why wouldn't it be wise for us to provide this shelter?

Dr. PANOFSKY. The question is, as has been said here many times, that the U.S. Government has the responsibility to save lives to the maximum extent possible. But what is involved there, as you correctly say, is both the means to save lives by means such as shelters, and also to decrease the risk of nuclear war ever occurring to start with.

It doesn't do any good if in the process of saving more lives in the event of nuclear war you increase the probability that nuclear war will occur or that it would be more violent if it does occur. So, therefore, there has to be balance. This is a matter of judgment.

And I am simply saying in my testimony that the very fact that some of us at least are considering the Soviet program threatening, indicates that a shelter program is an integral part of the strategic competition between the two countries; therefore the arms race is directly affected.

As far as affecting the general escalation of arms and the probability of war between the two, the problem I would like to emphasize here is the following: Somehow all this debate among the people at this table and in the country, reflects a struggle to try to get out of a trap in which we are.

We are in the situation where the Soviets can kill an enormous number of Americans and the Americans can kill an enormous number of Soviets and that basic potential is completely insensitive to what we may be doing about shelters or what we may be doing about different shifts in doctrines. The lack of clarity which Mr. Kahn referred to is a direct consequence of the fact that none of these strategies which different Secretaries of Defense announced are satisfactory, because they are trying to get out of the basic dilemma and the mutual hostage relationship between the two nations and they can't.

And therefore, I do believe that we have to make a basic policy that we must give absolute priority to the prevention of nuclear war over the ability to fight one. The difficulty is that this is a very hard priority statement for military people to accept and as soon as you start hedging and say yes, but if war breaks out anyway, then we must be able to do this and that, then it feeds back on the probability of the threat itself.

This is a basic dilemma of the nuclear age and you cannot get around it by trying to compare judgments of different people as to what the type of scenarios of nuclear war might be.

Senator PROXMIRE. I have some questions I would like to ask each of you gentlemen for the record and I have a closing statement. Before I make that statement I would like to have each of you, if you would like, to make any final statement or any summary statement. Why don't we start with Mr. Nitze and go right across.

Mr. NITZE. I would like to make a comment on Dr. Panofsky's last statement because I think he has put his finger on what is an essential point in the debate between us all.

My view is that a capability to fight a nuclear war and to survive is in fact the best way to prevent a war. Certainly we had that capability during the 1960's. And this was I think a very useful thing for us to have. There is another question, namely whether the main objective is to control the expansion of technology through diplomacy in a nuclear age. In other words, arms control.

In the period of the Gaither Committee Report, there was a growing instability due to the fact that we had all our strategic deterrent capability, or most of it, in our SAC bomber force, an adequate warning system and a very long period for the bomber force to get on alert. With the Soviets developing their capabilities and developing an ICBM capability, it was absolutely essential to restore stability.

If we hadn't restored stability the danger of war would have increased. I agree with Dr. Panofsky that the primary object of policy is to reduce the danger of war. But do you do that?

You do that, I think, by creating a situation under which the Russians could not gain, and could not hope to gain from entering into a nuclear exchange. There are things I think we can do so that they couldn't possibly gain. I don't think we are doing that. That is the issue.

I think I am just as devoted as Dr. Panofsky is to minimizing the risk of a nuclear war.

One further point. There was a good deal of talk about perception. Now, perceptions, to my mind, spring from what the facts are. That is, people can differ in their interpretation of the facts, but in the long run people have a valid judgment as to what the essential relationships are.

I don't think there was any doubt in anybody's mind that when we had a nuclear monopoly, we had a nuclear monopoly. There could be doubts as to the effectiveness of that nuclear monopoly. I think there was no doubt about the fact that in the early 1950's that we had a superior strategic position with our SAC bombers, superior to the Soviet bombers.

I think there was no doubt about the fact that we were running into a period of potential instability, dangerous instability which if not corrected could have increased the danger of war in the period of 1956 to 1961. I think there is no doubt about the fact that we got out of that danger by virtue of the intense application of technology, by developing dispersed missile systems et cetera which could not be destroyed in the first attack.

I think that we are now in a position where there are things that need to be done, and, that we ought to do them in order to reduce the danger of war.

Senator PROXMIER. Dr. Garwin.

Dr. GARWIN. Well, of course, the question is always the difference which might be made by the decision in question. It would be better if there were a clearer statement of what program would be undertaken if the Congress authorized civil defense, how it would come out, what the analysts think would be the results, but there are options which have been excluded arbitrarily from the debates.

If the question is vulnerability of Minuteman and the death of people by exposure to radiation which accompanies an attack on Minutemen, then we ought to look at deterring or defending against such an attack and making it unlikely to happen.

Not for a long time have people talked about defending Minutemen with systems strictly limited to that capability. I presented some material last September to the Foreign Relations Committee in this regard. (See appendix II, p. 80.) And there are many things that one can do and should begin to do now which would provide very severe doubts to the Soviet Union about their ability ever to attack if they thought they were going to be able to do so.

These range from fuse jamming to minor modifications of the environment around Minuteman sites and to the development of systems which would require for their deployment a renegotiation of the ABM treaty if that proves to be necessary, but these to my

mind have far more impact on the probability of Soviet attack on Minuteman than would a civil defense, or the absence of a civil defense system. And these are the primary questions. That is why I say civil defense is a side issue in the scenarios that have been advanced as an argument for civil defense.

Senator PROXMIER. Thank you very much.

Dr. Panofsky.

Dr. PANOFSKY. I believe Mr. Nitze and I, in fact everyone here at the table, agree that prevention of nuclear war is very much more important than any other consideration. The only problem is that the prescription which Mr. Nitze advocates escalates the total number of weapons which are required to reduce the probability of nuclear war. Therefore, he does not answer the question, which is very hard to answer, when is enough enough?

And, considering the fact that the total nuclear weapons in the world today is something like 30,000 warheads, and each one is larger than the one that caused the destruction of Hiroshima-Nagasaki, we really have to ask ourselves the question: Is this escalation really an acceptable means of making nuclear war less probable? Because, even if the probability of war does not increase by these counter-moves, we still have the situation, should conflict occur at the highest possible level, then we have a result which is an incomprehensible disaster.

Therefore, I feel we must not only give priority to those means which make nuclear war less likely, but we also must give priority to those strategies which give unequivocal answers to the question *When is enough enough?* And I agree with Mr. Kahn that no sane strategist would deliberately engage in the first attack which immediately kills 20 million people.

But I would also like to maintain there are situations where governments lose control over events. Certainly, we don't have to look very far back in history to recognize that our country and other countries were drawn into situations where they, in essence, were impelled to undertake moves which, in retrospect, turned out to be very ill-advised. And under the more rapidly developing scenario of nuclear war, we can never rule out the possibility that it will occur, despite the fact that sane planners, sane strategists, sane decisionmakers would not have engaged in this to start with.

I feel, again, the only sane thing to do is to make the price of crossing the nuclear threshold to start with as high as possible.

Senator PROXMIER. Thank you, sir.

Mr. Kahn.

Mr. KAHN. Let me start with the last remark of Professor Panofsky. He suggested one must never rule out the possibility of insane strategists and that even sane decisionmakers might escalate to the limit. I agree. But one should not rule out the possibility that even insane people might not escalate to the limit and that sane decisionmakers are even less likely to escalate in ways which are clearly counter-productive.

If you agree that one must not rule out the possibility of relatively favorable situations, then I have made 90 percent of my case.

Furthermore, Dr. Panofsky is a mathematician, and he knows one must not only allow for uncertainties, but one must calculate expect

tations. When you talk about war, you may be willing to increase the possibility if at the same time you can reduce the damage. If I told you that a certain policy increased the possibility of war by 1 part in 10 million but I increased the survival by a factor of 1,000, you might be willing to do it.

Finally it is important to understand that many of the things we do may increase the possibility of war, but we do it anyway. The objective of the game is not only to decrease the probability of war. Surrender might do that. The game is to survive and to have weight in the world, as well.

Finally, Professor Panofsky pointed out that we can't protect our people against surprise attack. That is an undesirable situation. We understand that; everybody understands that.

He made the correct comment that if one tries to get very high levels of defense, it is not cost-effective. He also made the comment that if you try to get minimum survival, say half or two-thirds of the people, it is cost-effective. But then he added, who wants to bother? Well, I do.

The problem is not so much one of a dilemma but of an unpleasant situation. There is an emotional problem here. Almost nobody is willing to discuss unpleasant situations realistically.

It was pointed out we may be drawn into situations beyond our control. I believe that is true. But such events are usually preceded by high levels of tension, which gives some kind of warning.

What can you get for \$300 million? First, you get a reasonable evacuation capability. There are some situations where the possibility of such an evacuation deters a Soviet planner from the actions which could touch it off.

So it is much too simple to say that this kind of preparation increases or decreases the probability of war. It increases the probability of certain scenarios leading to war and decreases others. It is just that complex.

Anybody who wants to make a statement has to say "on the average," or make an even more complex remark, and he has to make many assumptions in trying to assess the overall balance—it is rarely a simple and obvious situation.

Let me make a few remarks on which I believe all four members of the panel agree.

First, any attempt to get anything like 100 percent safety is going to be self-defeating or cost-ineffective under almost all circumstances.

Second, it is very hard to protect people in the cities against a surprise attack directed against people.

Third, we didn't discuss this much, but it is true. It is easy to protect most people if the attacker doesn't want to kill people.

Four, if an evacuation is successful, it is terribly cost-effective. Under almost all scenarios, and under all levels of budget, unless there are very high levels of attack, the evacuation is likely to make a large difference in casualties. This is particularly true of the level of attack that could occur at the end of a war, especially if the war starts with a war plan which a decisionmaker might approve; that is, if a war starts with a large counterforce attack in which the attacker both avoids damage to civilians and uses up a good deal of his inventory in the counterforce attack and then loses even more capability as a result of retaliating strikes by his victim. Later strikes, even if directed male-

volently, probably have less capability, not only because of a reduction in the number of available warheads, but because of disorganization caused by the counterattack.

Finally, most people believe we and the Soviets have a reliable second-strike ability. I am not at all sure of this. These systems have never been exercised in war. I can show you many weapons effects discovered in the last decade or two which could have prevented most of the retaliation by the then deployed forces and which came as surprises to us.

More important, when a person designs a system like, say, a battleship, you take it out and fire off the guns. You find a lot of defects that occur or show up. The system becomes unusable. You come back and fix the various problems. You then go out and fire again and then come back and fix the new problems. These systems have not been used in wartime. We just don't know how well they will work the first time.

I will make one final comment. All forces are invulnerable in peacetime—at least as far as the owners know. The defects one knows about are not the problem. One fixes them. It is the defects that one does not know about that are likely to be fatal.

You remember Singapore was firmly believed to be invulnerable until the war showed it was not. There is no such thing as designing an invulnerable system once and for all and then knocking off. It will take eternal vigilance and concern, even if you had the limited second-strike ability.

The biggest single appeal of the mutual assured destruction concept is it looks so simple. I do agree with Professor Panofsky, and with Dick Garwin, too, that any other concept does lead to complexities, concern, unlimited objectives. But this is life. I can't help that; it is just like that. Almost everything you do in life can be escalated or improved—at least potentially.

How much medical expenses are you prepared to pay? How much education do you want to give to people? How much welfare?

Senator PROXMIER. Mr. Nitze, in his opening remarks on the committee staff foreword that accompanied the Gaither Report, made three points that I noted here.

First, the staff foreword incorrectly said the U.S.S.R. then had fewer than a dozen operational ICBMs when they had none. The answer is that the staff analysis should have referred to the time of the "missile gap" in 1961 and 1962 rather than 1957. Mr. Nitze is correct in that respect.

In the second place, Mr. Nitze said the Gaither Report did not ignore arms control. Well, we have gone through that again. I have had the staff step out and go over the report. They can find no discussion of the impact of arms control in the report, no discussion under any section of the report.

Mr. Nitze said the Gaither Report did not speak of U.S. strategic inferiority. The report says the U.S.S.R. by 1959 may be able to launch an ICBM attack against the U.S. and SAC will be almost completely vulnerable. I should say the SAC would be almost completely vulnerable to such an attack according to the Gaither Report. The chart on page 14 of the Gaither Report shows this relationship of growing U.S. inferiority.

Mr. NITZE. I don't believe it does. I believe what it does is reflect military effort. It doesn't talk about superiority or inferiority in the report on page 14. It talks about the budget.

Senator PROXMIRE. Which is exactly the statement made in the foreword written by the staff.

Mr. NIIZE. That is a different point. No, they don't say that in the foreword. They slip easily from effort to superiority.

Senator PROXMIRE. Well, let me make my concluding statement.

As we close today's hearing, let me say once again that the testimony of our guests will help the committee develop an approach to civil and industrial preparedness and in formulating recommendations for the legislative committees of the Congress. There is no doubt in my mind that we have established an important record today, not only for subsequent hearings and for the consideration of committee members, but also for the consideration of the entire Congress and for the citizens of our country.

I do not believe we have resolved all of the questions that face the Congress and the country in connection with our security and our civil defense posture. But I would like to highlight two conclusions that I have drawn from today's discussion.

The first is that we are in the midst of a major revolution in strategic thinking. Whether or not you agree with the premises underlying this shift, our strategy and our weapons development programs may for the last few years have moved from deterring any kind of nuclear war to deterring escalation after nuclear war has begun.

Second, it seems to me that today's testimony suggests that there is very little middle ground between a modest civil defense and massive civil defense. Heretofore, we have been content with a minimal civil defense posture, one that appears to be consistent with the nature of the risk, with the resources we are willing to commit, and with the doctrine we have espoused.

But if the doctrine of limited nuclear war truly requires a civil defense program to be credible, if we feel we must catch up to the Soviet civil defense program and close the so-called civil defense gap, then there seem to be only two choices.

Either we can embark on a massive civil defense program that will encompass the entire country in order to be equitable, or we can explore the possibility of negotiating a halt to the arms race before it adds a new heat in the form of a civil defense race to the already costly strategic arms competition.

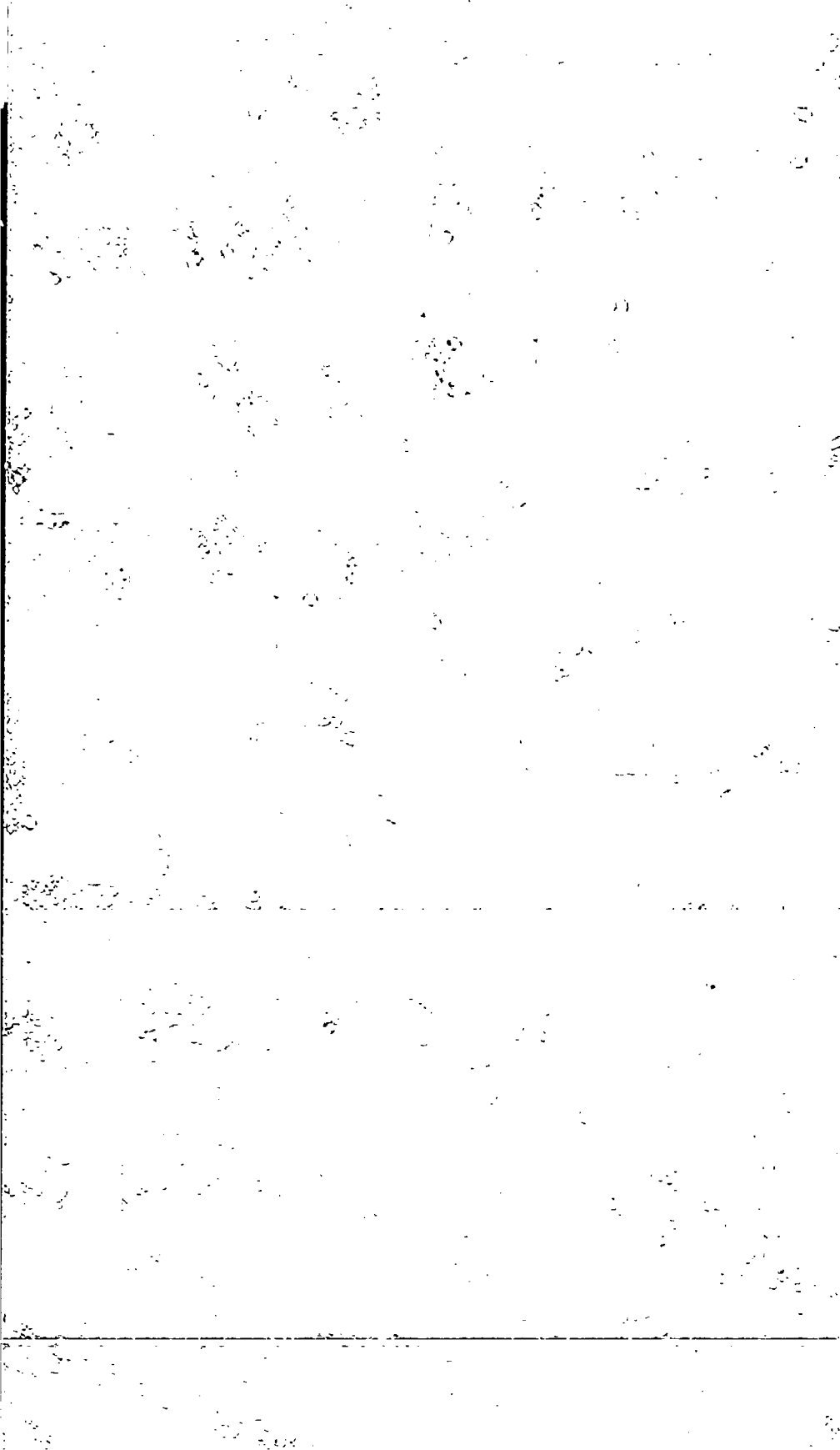
I hope that Americans have not become so used to discussions of nuclear holocaust that they neglect the choices that lie before them. We are told that the Soviet menace still lies in the future and that we have a few years to make crucial decisions and negotiate crucial agreements.

It would be a pity if apathy is the major determinant of our choices. An open-ended arms competition and an open-ended civil defense competition could cost immensely and lead more surely to nuclear war. So in the end we may still have a nuclear catastrophe that will cost us dearly in lives, since the arms race has so far been unable to find a way of stabilizing the strategic balance that has been the goal of our policy.

I want to thank you gentlemen very much.

The committee stands in recess.

[Whereupon, at 1:25 p.m., the hearing was recessed to reconvene at a later time.]



APPENDIX I

PAUL HENRY NITZE

In the spring of 1969, Paul Henry Nitze was appointed the representative of the Secretary of Defense to the United States Delegation to the Strategic Arms Limitation Talks with the Soviet Union; a position he held until June 1974, at which time he resigned.

Mr. Nitze resigned from his duties as Deputy Secretary of Defense on January 20, 1968, a position he had held since July 1, 1967, succeeding Cyrus R. Vance.

Mr. Nitze was serving as 57th Secretary of the Navy when he was nominated by former President Lyndon B. Johnson on June 10, 1967, to become Deputy Secretary of Defense. He was confirmed by the United States Senate on June 29, 1967.

The late President John F. Kennedy nominated Mr. Nitze to be Secretary of the Navy on October 14, 1963. At that time he was serving as Assistant Secretary of Defense (International Security Affairs), having assumed that position on January 29, 1961. He began his duties as Secretary of the Navy on November 29, 1963.

Graduated "cum laude" in 1928 from Harvard University, Mr. Nitze subsequently joined the New York investment banking firm of Dillon Read and Company. In 1941, he left his position as Vice President of that firm to become financial director of the Office of the Coordinator of Inter-American Affairs.

From 1942-1943, he was Chief of the Metals and Minerals Branch of the Board of Economic Warfare, until named as Director of Foreign Procurement and Development for the Foreign Economic Administration.

During the period 1944-1946, Mr. Nitze was Vice Chairman of the United States Strategic Bombing Survey. He was awarded the Medal of Merit by President Truman for service to the nation in this capacity.

For the next seven years, he served with the Department of State, beginning in the position of Deputy Director of the Office of International Trade Policy. In 1948, he was named Deputy to the Assistant Secretary of State for Economic Affairs. In August, 1949, he became Deputy Director of the State Department's Policy Planning Staff, and Director the following year.

Mr. Nitze left the federal government in 1953 to become President of the Foreign Service Educational Foundation in Washington, D.C., a position he held until January 1961.

Mr. Nitze is Chairman of the Advisory Council of The Johns Hopkins School of Advanced International Studies in Washington, D.C., and also serves on the Board of Trustees of the University. He holds memberships on the Board of Directors of Schroders, Inc., in New York, and Schroders, Ltd., in London, The American Security and Trust Company of Washington, D.C., Northwestern Mutual Life Mortgage and Realty Investors of Milwaukee, Wisconsin, and is Chairman of the Board of the Aspen Skiing Corporation.

HERMAN KAHN

Herman Kahn was born in Bayonne, New Jersey, in 1922. He received a B.A. from UOLA in 1945 and an M.S. in physics from the California Institute of Technology in 1948. He was associated with the Rand Corporation before becoming in 1961 the principal founder and director of the Hudson Institute, a research organization studying public policy issues, with headquarters in Croton-on-Hudson, N.Y. His international reputation as a strategic warfare analyst or, as the *New Republic* put it, one of "the prophets of strategic reality," is based on his work at the Institute and on his books: *On Thermonuclear War* (1960), *Thinking about the Unthinkable* (1962), *On Escalation* (1965 and, revised *Politics*

edition, 1968), and (in collaboration with Anthony J. Wiener) *The Year 2000* (1967).

RICHARD L. GARWIN

Richard L. Garwin was born in Cleveland, Ohio, in 1928. He received the B.S. degree from Case Institute of Technology, Cleveland, in 1947, and the Ph. D. degree in physics from the University of Chicago in 1949.

After three years on the faculty of the University of Chicago, he joined IBM Corporation in 1952, and is at present IBM Fellow at the Thomas J. Watson Research Center, Yorktown Heights, New York, and Adjunct Professor of Physics at Columbia University. In addition, he is a consultant to the U.S. Government on matters of military technology, arms control, etc. He has been Director of the IBM Watson Laboratory, Director of Applied Research at the IBM Thomas J. Watson Research Center, and a member of the IBM Corporate Technical Committee. During 1974 Fall Semester he was a Visiting Professor of Applied Physics at Harvard University, working primarily on arms control in the Program for Science and International Affairs.

His fields of research have included work on liquid helium, superconductors, fundamental particles of physics, and on novel computer and communication elements and systems. He has made contributions in the design of nuclear weapons, in instruments and electronics for research in nuclear and low-temperature physics, in the establishment of the nonconservation of parity and the demonstration of some of its striking consequences, in computer elements and systems including superconducting devices, in communication systems, in the behavior of solid helium, and in military technology. He has published about 70 papers and been granted 20 U.S. patents. He has testified to many Congressional committees on matters involving national security or transportation.

He was a member of the President's Science Advisory Committee 1962-65 and 1969-72 and of the Defense Science Board 1960-69. He is a Fellow of the American Physical Society and of the American Academy of Arts and Sciences, and a member of the National Academy of Sciences, the Institute of Medicine, and the Council on Foreign Relations.

His work for the government has included studies on antisubmarine warfare, new technologies in health care, sensor systems, military and civil aircraft, and satellite and strategic systems, from the point of view of improving U.S. systems as well as assessing existing capabilities.

W. K. H. PANOFKY

Degrees

1938, A.B. Princeton University; 1942, Ph. D., California Institute of Technology; 1963, D. Sc. (Hon.), Case Institute of Technology; and 1964, D. Sc. (Hon.), University of Saskatchewan, Canada.

Experience

1942-3, Director, Office of Scientific Research & Development Project, California Institute of Technology, Pasadena; 1943-5, Consultant, Manhattan District, Los Alamos, N. Mex.; 1945-6, Physicist, Radiation Laboratory, University of California at Berkeley; 1946-8, Assistant Professor of Physics, University of California at Berkeley; 1948-51, Associate Professor of Physics, University of California at Berkeley; 1951-63, Professor of Physics, Stanford University; 1953-61, Director, Professor, Stanford High Energy Physics Laboratory; and, 1961-, Director, Professor, Stanford Linear Accelerator Center, Stanford University.

Special Fields

X-rays and natural constants; accelerator design; nuclear research; high-energy particle physics.

Activities

1945-60, Division of Military Application, U.S. Atomic Energy Commission; 1954-58, Member, Physics Panel, National Science Foundation; 1955-57, U.S. Air Force Scientific Advisory Board.

1961, Consultant, Radiation Laboratory, University of California, Berkeley; 1958, Consultant, Stanford Research Institute, Menlo Park, California; 1960-64,

President's Science Advisory Committee; 1959, Office of Director of Defense Research and Engineering (member, Ad Hoc Group on Detection of Nuclear Explosions).

1959, WAE Foreign Service Office, Department of State: Chairman, U.S. Delegation (Geneva), Technical Working Group on High Altitude Detection; Vice-Chairman, U.S. Delegation (Geneva), Technical Working Group 2.

1958-60, Member, High Energy Commission of International Union of Pure and Applied Physics; 1958-60, Review Committee for the Particle Accelerator Division and High Energy Physics Division, Argonne National Laboratory.

1960-61, Advisory Council, Department of Physics, Princeton University; 1958-62, Advanced Research Projects Agency, Consultant; 1963-66, Physics Survey Committee, National Academy of Sciences; 1964, Advisory Committee, 200-BeV Accelerator Study, Lawrence Radiation Laboratory, Berkeley.

1965-73, Consultant, Office of Science and Technology, Executive Office of the President, 1965-73, Steering Committee, JASON Division, Institute for Defense Analyses; 1959-, Consultant, Arms Control & Disarmament Agency.

1967-70, Member, High Energy Physics Advisory Panel to the Atomic Energy Commission; 1968-72, Advisory Committee, Brookhaven National Laboratory; 1968-71, Advisory Committee, Cambridge Electron Accelerator Laboratory; 1968-71, Advisory Committee, Physics Department, University of Rochester; 1960-71, Advisory Committee, Physics Mathematics & Astronomy Depts., California Institute of Technology.

1960-70, Co-Chairman, Stanford Mid-Peninsula Urban Coalition; 1973-, Board of Directors, Annual Reviews, Inc.; 1976-, Ford Foundation Nuclear Energy Policy Study Group.

Societies

Phi Beta Kappa; American Physical Society (Fellow and 1974 President); Sigma Xi; National Academy of Sciences; American Academy of Arts and Sciences' Council on Foreign Relations.

Awards

Guggenheim Fellowships (1960 and 1973); Ernest Orlando Lawrence Memorial Award (1961); Richtmyer Lecture (1963); California Institute of Technology—Alumni Distinguished Service Award (1966); California Scientist of the Year Award (1967); National Medal of Science (1969); Franklin Institute Award (1970); Annual Public Service Award, Federation of Amer. Scientists—1973.

Publications

Classical Electricity and Magnetism (with M. Phillips), Cambridge, Addison-Wesley (1955); 2nd edition (1962); numerous scientific papers in professional journals.

APPENDIX II

HOW REAL IS A SOVIET THREAT TO MINUTEMAN?

(By Richard L. Garwin)

The most authoritative explication of the "Strategic Doctrine" of former Secretary of Defense Schlesinger is to be found in his "Annual Defense Department Report for FY-1976 and FY-1977" of February 5, 1975. That doctrine emphasizes two capabilities—flexible strategic options and hard-target killers. The first is unexceptional, especially insofar as our strategic forces have long been capable of being assigned limited flexible options, although perhaps a President had not been confronted with the necessity to propose or endorse specific options. The second—a force of efficient hard-target killers (silo killers)—aroused much opposition. The Secretary emphasized that "We would prefer to see both sides avoid major counterforce capabilities. We do not propose, however, to concede to the Soviets the unilateral advantage in this realm." Since our own silo-killing force was to be housed in those very Minuteman silos which were assumed to be effectively destroyable by the Soviet Union, it was not clear how such an action would counter that danger to Minuteman, except by the threat of preemptive attack. Indeed, were a force of Soviet silo killers really to materialize it is likely that the Defense Department would request funds and approval to develop and deploy mobile ICBMs.

In support of his Strategic Doctrine, the Secretary testified September 11, 1974, to the effect that a particular Soviet attack on ICBM silos with a single 1-MT weapon per silo might kill some 800,000 people. Two reports from the Ad Hoc Panel on Nuclear Effects (and later DoD testimony) with more realistic casualty estimates for a militarily effective attack on the ICBM force show fatalities on the order of 3.5 to 22 million. Reference 1 summarizes the history and current state of the dialog on this score, but does not analyze in any detail whether the assumed Soviet forces indeed could cause or even be expected to cause the assumed damage to Minuteman. If there were real impediments to such an attack, a glossing over of such difficulties might make such an attack more probable. Conversely, if one can show that the assumed force is indeed incapable of effective attack on Minuteman, that would greatly reduce the chance of use and might even discourage the building of such a force. The following discussion raises grave doubts about the feasibility of effective countersilo attack. It also emphasizes the degree to which we have ignored systems capable of preserving Minuteman although incapable of defending softer targets such as cities or unique targets such as command centers.

Consider first the low-drag RV (reentry vehicle) preferred to obtain adequate accuracy in the face of uncertainty of winds. Assume

that the RV contains a 1-MT warhead, that the velocity at atmospheric reentry makes an angle of 22 degrees to the horizontal, and that the RV is desired to detonate at an altitude of 500 feet above the silo. A low-drag RV would still be hypersonic at this altitude. No reasonable self-contained drag or barometric fuze could distinguish between this 98.4% penetration of the standard atmosphere and 100% penetration of the atmosphere. Detonation at 99.4% penetration (180 foot altitude) would add almost 800-foot displacement to the burst. The alternative—radio-altimeter or radar fuzing—possesses adequate accuracy but would be the height of foolishness in view of U.S. jamming prowess in general and the particular necessity of the RV to detonate within some hundreds of feet of the silo.

Therefore the offense is driven to the use of a contact (nose) fuze, which presumably works well enough against flat ground. However, should each Minuteman silo be provided with a thicket of steel palings arranged 2 feet apart east-west rows 2000 feet long, with about 150 rows at 15-foot north-south spacing (the palings being of 1 1/4-inch-diameter steel reinforcing rod 7 feet long, driven 2 feet into the ground), it is unlikely that the fuze would strike either the ground or one of the palings. Rather, the RV at hypersonic velocity would destroy itself (without nuclear detonation) by contact with one of the palings.

Of course, precursor bursts could be used to attack this "bed of nails" containing some \$60,000 worth of steel. But alternative (if less passive) defenses are also possible.

Both air-burst and ground-burst low-drag RVs attacking silos can be countered by a pebble-fan projector—an east-west line 1000 feet north of each Minuteman silo and 1000 feet long, consisting of propellant emplaced in the ground to project a curtain or fan of pebbles up to 1000 feet in the air. One could use a radar at the silo or an upward-looking radar deployed perhaps 10,000 feet forward and looking up to detect the RV and to project the fan. Ten tons of steel pellets would cost about \$2000 and could be projected by less than one ton of propellant. A multi-shot capability to deal with several RVs (or decoys) per silo is readily affordable by deploying multiple such projectors, which are inherently hard. The radar need have a range of only a few hundred feet against an RV side-on, where radar cross sections are very large. The 10 tons of pellets, of 10 grams each, can provide a projected density of 1 pellet per square foot over a protective screen 1000-foot square, providing a very high probability of dudding or detonating a hypersonic RV.

If the offense abandoned at great expense its force of low-drag RVs and returned to high-drag RVs, it would seriously impair its accuracy. An RV which falls at an average 400 feet per second from 20,000 feet takes 50 seconds to do so and would be carried 1500 feet down-wind by a 20 mile per hour wind (What are the winds in the Minuteman fields under attack?). The same 50-second descent and straight-line fall toward the silo, together with the requirement to detonate within 1000 feet or so to destroy the hardened silo, makes the high-drag RV an ideal target for a rapid-fire, self operating, automatic gun of the type recently deployed by the Army for air defense, and for more-advanced guns being examined by the Navy for defense of ships against homing cruise missiles. Not only are these systems of reasonable cost for silo

defense, but they can be deployed far more rapidly than can a fleet of effective silo-killing missiles and RVs on the offensive side.

Naturally, it is important to determine whether these defensive systems for Minuteman are allowable under the ABM Treaty of May 26, 1972. The bed of nails is surely permitted, but the deployment of guns and pebble-fan projectors for the defense of silos appears to be forbidden by the Treaty. The situation is not clear in regard to fuze jamming. But exploration of such concepts and development of equipment is surely permitted.

The availability of these technologies for the defense of Minuteman silos should emphasize to the Soviet Union the lack of utility of a large investment in reliable, high yield MIRVs which would be required to effectively attack Minuteman silos. If the Soviet Union were indeed to be observed most of the way through a major deployment program with the capacity to destroy Minuteman silos, the U.S. might negotiate a modification in the ABM Treaty which would permit the extensive deployment at Minuteman silos of specialized systems described here, which have the capability only of defending silos. Failing quick success in such negotiation, the U.S. could proceed with deployment under the "supreme national interest" provision of the Treaty.

Such systems, perhaps because of the old-fashioned technology employed or because they are incapable of defending a large spectrum of targets, arouse little interest within the U.S. Defense Department, which is surprising in view of the enormous emphasis given by Secretaries of Defense and others since 1969 to the question of Minuteman vulnerability.

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1. "Analyses of Effects of Limited Nuclear Warfare." (Committee Print, September 1975), prepared for Subcommittee on Arms Control, International Organizations and Security Agreements of the COMMITTEE ON FOREIGN RELATIONS, United States Senate. (156 pp.)

ASSURING STRATEGIC STABILITY IN AN ERA OF DÉTENTE¹

By Paul H. Nitze

EVEN though the translation of the Vladivostok Accord on strategic arms into a SALT II Treaty has not yet been resolved, I believe it is now timely to take stock of the strategic arms balance toward which the United States and the Soviet Union would be headed under the terms of such a treaty. To that end it is necessary to raise certain basic questions about the maintenance of strategic stability—in terms of minimizing both the possibility of nuclear war and the possibility that nuclear arms may be used by either side as a means of decisive pressure in key areas of the world.

It appears to be the general belief that while such strategic stability may not be assured by the SALT agreements, it is not and will not be substantially endangered—that on the contrary it has been furthered by the SALT negotiations and agreements since 1969—and that in any event the best hope of stability lies in further pursuit of negotiations with the aim of reducing the level of strategic weapons and delivery systems on both sides. Unfortunately—and to the profound regret of one who has participated both in the SALT negotiations and in a series of earlier U.S. decisions designed to stabilize the nuclear balance—I believe that each of these conclusions is today without adequate foundation.

On the contrary, there is every prospect that under the terms of the SALT agreements the Soviet Union will continue to pursue a nuclear superiority that is not merely quantitative but designed to produce a theoretical war-winning capability. Further, there is a major risk that, if such a condition were achieved, the Soviet Union would adjust its policies and actions in ways that would undermine the present détente situation, with results that could only resurrect the danger of nuclear confrontation or, alternatively, increase the prospect of Soviet expansion through other means of pressure.

While this highly disturbing prospect does not mean that strategic

¹ Paul H. Nitze, Chairman of the Advisory Council, Johns Hopkins School of Advanced International Studies, member of the U.S. SALT Delegation, 1969-74; Deputy Secretary of Defense, 1967-69; Secretary of the Navy, 1963-67. The text submitted is an article published in *Foreign Affairs*, January 1976.

arms limitation should for a moment be abandoned as a U.S. (and world) goal, the practical fact we now face is that a SALT II treaty based on the Vladivostok Accord would *not* provide a sound foundation for follow-on negotiations under present trends. If, and only if, the United States now takes action to redress the impending strategic imbalance, can the Soviet Union be persuaded to abandon its quest for superiority and to resume the path of meaningful limitations and reductions through negotiation.

Finally, I believe that such corrective action *can* be taken: (a) within the framework of the Vladivostok Accord; (b) with costs that would increase the strategic arms budget marginally above present levels (themselves less than half the strategic arms budget we supported from 1956 through 1962, if the dollar values are made comparable); (c) with results that would encourage the diversion of the Soviet effort from its present thrust and in directions compatible with long-range strategic stability. At the close of this article I shall outline the key elements in such a corrective program.

II

Let us start with a brief review of the overall state of Soviet-American relations. The use of the word "détente," in its current sense, began in 1971. U.S. efforts to improve its relations with the Soviet Union go back to 1933. They dominated the War and the immediate postwar period, and the early years of the Eisenhower Administration. They formed an important strand of U.S. foreign policy in both the Kennedy and Johnson Administrations. The word "détente" as currently used implies something different from these efforts; it implies that their goal has now been achieved and that all that remains to be done is to make détente "irreversible."

The chain of events leading to the present situation goes back to the Sino-Soviet split and the great buildup of Soviet forces facing China. There were about 15 Soviet divisions facing China in the mid-1960s; between 1968 and 1972 the number grew to at least 45 divisions. This caused the Chinese Communists to be deeply concerned about the danger of an attack by the Soviet Union on China. The Chinese turned to the one power that could help deter such an attack; they opened the ping-pong diplomacy that resulted in the so-called normalization of U.S. relations with China.

Mr. Nixon was, I think, correct in taking the position that he wished good relations with both China and the U.S.S.R. and did not want an alliance with either. Moscow, however, wanted to be sure that the new relationship between China and ourselves did not deepen

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into something closer to an alliance and thus impede Soviet policy toward China. For this and other reasons the Russians began to go out of their way to be friendly to Mr. Nixon and Mr. Kissinger. They opened up a vista of relaxation of tensions and of a growing collaboration between the United States and the Soviet Union. In 1972 not only were the SALT I agreements—the Anti-Ballistic Missile (ABM) Treaty and the Interim Agreement—entered into, but also there was signed at Moscow a document called Basic Principles of Relations Between the United States and the Soviet Union. Together with a subsequent agreement signed in Washington in 1973, this laid out what appeared to be a good basis for continuing relations between the U.S.S.R. and ourselves. Among other things, these agreements called for collaboration to see to it that crisis situations in other parts of the world did not build up into confrontations which could increase the risk of war between the two countries. It was understood that this collaboration was to have special reference to Southeast Asia and to the Middle East. These bilateral agreements were accompanied by the Paris Agreements with respect to Vietnam, and the Soviet Union was among those guaranteeing that the Paris Agreements would be implemented and abided by.

These understandings, however, produced no positive Soviet actions. With respect to the final North Vietnamese takeover in Southeast Asia, the Soviets actually took actions to help the North Vietnamese violate the agreements. With respect to the Middle East, it is hard to sustain the argument that is often made that the Soviets exercised restraint in the October 1973 crisis. There appears to have been little that they refrained from doing to encourage and make possible the attack by Egypt and Syria on Israel and the OPEC action on oil prices and the embargo. The Soviets not only trained and equipped the Egyptians and the Syrians for their surprise attack, but also failed to warn us when they knew that an attack was imminent. When the battle turned against the attackers, they threatened to intervene with their forces.

These two experiences in Southeast Asia and in the Middle East are bound to make us skeptical that the Soviet leaders are in fact moving toward any lasting reduction in tensions, or any abandonment of expansionist aims. A further ground for skepticism comes from what Soviet leaders are saying to their own people, and especially what they are saying in authoritative pronouncements aimed at leadership circles. Here readings of the past year are all too clear. To take but one example, there were published in January 1975 companion articles, one by Boris Ponomarev, a deputy member of the Politburo,

the other by Aleksandr Sobolev, a leading theoretician, each arguing that the evolution of the correlation of forces—in which they include not only military but economic and social forces—has moved very favorably from the standpoint of the Soviet Union over recent years.¹ Hence, they say, it is now possible to shift the target of communist action from the formerly colonial world to the developed world—particularly Europe. This shift in target is made possible by two things: one of them is "détente" and the other is "nuclear parity" (as they interpret the term, in a way we shall examine shortly).

In the sum total there are strong grounds for concluding that in Soviet eyes "détente" is not that different from what we used to call the "cold war." When we talked about the "cold war" we were in part emphasizing the fact that despite the deep hostility of the U.S.S.R. to the West in general and to the United States in particular, it would be a terrible thing if there were to be a "hot war" with the Soviet Union. When the Soviets use the word "détente" in their internal writings, they make it clear that they intend "détente" to mean the same thing as "peaceful coexistence." Peaceful coexistence, they make it clear, implies no change in their basic objectives, while they expect that current tactics will weaken the West and strengthen the socialist states.²

III

However one reads these broader signs of present Soviet behavior, a prime touchstone of the reality of détente—not only now but for the future—must lie in the area of strategic arms. If the Soviets are acting (and negotiating) in a way that gives promise of a stable nuclear balance (with meaningful reduction in due course), then the future of détente is clearly much brighter. If they are not, however, then the disturbing signs must be taken more seriously, and the long-term dangers are great indeed.

Let us begin by discussing the similarities and contrasts between Soviet and American views on certain strategic questions.

"Is the avoidance of war—particularly a nuclear war—between the two countries desirable?" On this question I think both sides are in agreement. However, there is a certain difference of approach. Clausewitz once said that the aggressor never wants war; he would prefer to achieve his objectives without having to fight for them. The

¹ B. N. Pomunarev, "The Role of Socialism in Modern World Development," *Problemy Mira i Sotsializma* (Problems of Peace and Socialism), January 1975, pp. 4-13; A. I. Sobolev, "Questions of the Strategy and Tactics of the Class Struggle at the Present Stage of the General Crisis of Capitalism," *Rabochiy Klass i Sovremennyy Mir* (The Working Class and the Contemporary World), January 1975, pp. 3-20.

² See comments by Aleksey Rumiantsev, at a conference sponsored by *Problemy Mira i Sotsializma*, Summer 1975.

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Soviets take seriously their doctrine that the eventual worldwide triumph of socialism is inevitable; that they are duty bound to assist this process; and that, as the process progresses, the potential losers may stand at some point and feel impelled to fight back. On the U.S. side some say that there is no alternative to peace and therefore to détente. This attitude misses two points. The first is that capitulation is too high a price for free men. The second is that high-quality deterrence, not unilateral restraint to the point of eroding deterrence, is the surest way of avoiding a nuclear war.

This thus leads to a second pair of questions: "Is nuclear war unthinkable? Would it mean the end of civilization as we know it?" We in the United States tend to think that it is, and this view prevailed (except for a small group of believers in preventive war, who never had strong policy influence) even in the periods when the United States enjoyed a nuclear monopoly and, at a later time, a clear theoretical war-winning capability.³ When the effort was made in the late 1950s and early 1960s to create a significant civil defense capability, public resistance soon aborted the effort, so that today the United States has only the most minute preparations in this area. Rather, Americans have thought throughout the last 30 years in terms of deterring nuclear war, with the debate centering on how much effort is necessary to maintain deterrence, to keep nuclear war unthinkable.

In the Soviet Union, the view has been quite different. Perhaps initially because of the U.S. monopoly, Soviet leaders from the outset discounted the impact of nuclear weapons to their people. But as the Soviet nuclear capability grew, the Soviet leaders still declined to depict nuclear war as unthinkable or the end of civilization. On the contrary, they directed, and still direct, a massive and meticulously planned civil defense effort, with expenditures that run at approximately a billion dollars a year (compared to U.S. civil defense expenditures of approximately \$80 million a year).⁴ The average Soviet citizen is necessarily drawn into this effort, and the thinking it represents appears to permeate the Soviet leadership. In the Soviet Civil Defense Manual issued in large numbers beginning in 1969 and 1970,

³ To see how top officials viewed American nuclear power even in the period of American monopoly, one can now consult the recently declassified text of the NSC 68 policy paper dated in the spring of 1950. Even though Soviet nuclear capacity (after the first Soviet test of August 1949) was assessed as small for some years to come, that paper rejected any idea of reliance on American nuclear power for the defense of key areas. To be sure, in the 1950s under John Foster Dulles, the United States had a declaratory policy of "massive retaliation." But in the actual confrontations of that period, this declaratory policy was not in fact followed; instead, conventional force was used, for example in the Lebanon crisis of 1958 and, less directly, in the Offshore Islands crisis of the same year. After 1961 massive retaliation was abandoned.

⁴ Eugene Wigner, "The Atom and the Bomb," *Christian Science Monitor*, November 13, 1974, p. 4.

the estimate is made that implementation of the prescribed evacuation and civil defense procedures would limit the civilian casualties to five to eight percent of urban population or three to four percent of the total population—even after a direct U.S. attack on Soviet cities. The Soviets may well overestimate the effectiveness of their civil defense program, but what is plain is that they have made, for 20 years or more, an approach to the problem of nuclear war that does assume, to a degree incomprehensible to Americans (or other Westerners), that nuclear war could happen, and that the Soviet Union could survive.

These differences in approach and attitude appear to be basic and deeply rooted. In essence, Americans think in terms of deterring nuclear war almost exclusively. The Soviet leaders think much more of what might happen in such a war. To the extent that humanitarian and moral objections to the use of nuclear weapons exist in the Soviet Union—as of course they do—such objections are subordinated for practical planning purposes to what Soviet leaders believe to be a realistic view.

It may be argued that these differences are more apparent than real, and that with the passage of time and the emergence of near-equality in the respective nuclear capabilities the differences are today less significant. Unfortunately, as the civil defense picture suggests, the trend in comparative nuclear weapons capabilities has if anything accentuated them.

That this is so can be seen in the more concrete realm of nuclear strategic concepts, and the postures that result from them. Often over-refined or expressed in terms hard for the layman to grasp, the range of strategic nuclear concepts available to any nuclear-weapons nation in fact boils down roughly to five:

1. *Minimum Deterrence.* This means a capacity to destroy a few key cities with little if any counterforce capacity to attack a hostile nation's military forces. In essence, it relies on the threat alone to deter. As between the Soviet Union and the United States, in the event deterrence failed, this level of American capacity would concede to the Soviet Union the potential for a military and political victory. The Soviets would risk U.S. retaliation against a portion of their industry and population, if our action policy in the event deterrence failed turned out to be the same as our declaratory policy before deterrence failed. To reduce this risk of retaliation, the Soviets could limit their attack to U.S. forces and continue to hold the U.S. population as hostage. In sum, the effect of this level of deterrence would be to provide limited deterrence of a full-scale attack on the U.S. population. It would have less strength in deterring a Soviet attack on U.S. forces

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or on allies whose security is essential to our own.

2. *Massive Urban/Industrial Retaliation.* As the name implies, this posture is designed to destroy many cities, many millions of people and much productive capacity, and to do so on an assured second-strike basis. This level of deterrence, sometimes called "Assured Destruction," would concede to the Soviet Union the potential for a military victory if deterrence failed, but (it would be anticipated) would make any such victory worthless in political terms. This form of deterrence differs from minimum deterrence largely in the degree of damage to Soviet industry and population it would threaten.

3. *Flexible Response.* In this form of deterrence the United States would have the capability to react to a Soviet counterforce attack without going immediately to a counter-city attack. It would thus increase the credibility of deterrence. The question of military or political victory if deterrence fails would depend upon the net surviving destructive capacity of the two sides after the initial counterforce exchanges. If the net surviving capacity after such a flexible response were grossly to favor the Soviet Union, or if each limited exchange placed the United States in a progressively weaker relative position, we are back to the minimum deterrence or massive urban/industrial retaliation situation, depending on the amount of surviving effective nuclear capability on the U.S. side.

4. *Denial of a Nuclear-War-Winning Capability to the Other Side.* This means a nuclear posture such that, even if the other side attacked first and sought to destroy one's own strategic striking power, the result of such a counterforce exchange would be sufficiently even and inconclusive that the duel would be extremely unattractive to the other side. This level of deterrence, in addition to deterring an attack on U.S. population centers, should also deter a Soviet attack on U.S. forces or those of its allies. In practice, against any major nuclear nation, the posture would also include a capacity for effective massive urban/industrial retaliation if such a strategy were called for.

5. *A Nuclear-War-Winning Capability.* This would be a position so superior that, whatever the initial forms of nuclear exchange, one's own surviving capacity would be enough to destroy the war-making ability of the other nation without comparable return damage. Such a U.S. posture would deter any Soviet attack on the United States and could also limit other serious Soviet military initiatives contrary to U.S. and allied interests. However, Soviet weapons technology and program momentum are such that the United States probably could not obtain this capability.

A review of the choices made by the United States and the Soviet

Union among these five concepts goes, I believe, further than any other form of analysis in explaining and clarifying the changes in the strategic balance since 1945. Until roughly 1954, the United States retained nuclear superiority without extraordinary effort. By the late 1950s, the vulnerability of American bomber bases (bombers then being the only effective delivery method) emerged as a serious weakness in the American posture.³ This weakness, and the rapid advances in missile technology of the period, led the United States between 1956 and 1962 to place great emphasis on ensuring the survivability of its nuclear striking power; average strategic obligational authority during these years was about \$18 billion a year in 1974 dollars.⁴ As a result the feared intercontinental ballistic missile (ICBM) "gap" of the 1960 presidential campaign never in fact became reality, but on the contrary the United States re-established a clearly superior nuclear capability by 1961-62. This was the situation at the time of the only true nuclear confrontation of the postwar period, the Cuban missile crisis of the fall of 1962.

Up to that point something approaching a war-winning capability seemed to many Americans the best possible form of deterrence, and thus desirable. However, as it became clear that the Soviet Union, too, was developing massive and survivable missile delivery capabilities, this view changed to the belief that even though a nuclear war might be won in a purely military sense, it could not be won in a political sense. That led to the further view that mutual deterrence through mutually assured destruction was the best feasible objective.

I have explained elsewhere at greater length the decisions of the early 1960s, in which I was one of those who participated with Robert McNamara, then Secretary of Defense.⁵ In essence, the United States opted at that point to stress technological improvement rather than expanded force levels. While numerical comparisons were not ignored, the basic aim was an underlying condition of what may be called "crisis stability," a situation where neither side could gain from a first strike, and of "mutual assured destruction," where each side would have a fully adequate second-strike capability to deter the other. In such a condition it was believed that neither could realistically

³ See Albert Wohlstetter, "The Delicate Balance of Terror," *Foreign Affairs*, January 1959, pp. 211-234.

⁴ It should be noted that this figure refers to the amounts obligated annually for equipment, materiel, and personnel that can be directly attributed to the program mission, including all support costs that follow directly from the number of combat units. It does not include allocable costs of such related activities as communications, general support, and intelligence.

⁵ See Paul H. Nitze, "The Vladivostok Accord and SALT II," *The Review of Politics* (University of Notre Dame), April 1975, pp. 147-60, especially pp. 149-50.

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threaten the other in the area of strategic weapons, and that the result would be much greater stability and higher chances of the peaceful resolution of crises if they did occur. While nuclear weapons would always be a major deterrent, the conventional arms balance at any point of confrontation would remain important (as it had been in the Berlin crisis of 1958-62 and also in the Cuban missile crisis itself). In short, the aim was to downgrade nuclear weapons as an element in U.S.-Soviet competition and to prepare the way for systematic reductions in nuclear arms. If both sides were to adopt such a concept, it should be possible, over time, to move from what might be called a "high deterrent" posture to a "low deterrent" posture, with the deterrent remaining essentially equivalent on both sides but at successively lower levels.

As the United States thus adjusted its posture, the invitation for the Soviet Union likewise to seek a similar posture—and stop there—was patent both from statements of American policy and from the always-visible American actions. Unfortunately, however, the Soviet Union chose to pursue a course that was ambiguous: it could be interpreted as being aimed at overtaking the United States but then stopping at parity; it could, however, be interpreted as being aimed at establishing superiority in numbers of launchers and in throw-weight* and, perhaps ultimately, a nuclear-war-winning capability on the Soviet side.

It is important to consider the reasons that may have entered into this choice. In part, the Soviet leaders may have been motivated by technological factors—that they had already moved to heavy rockets but were behind in other areas, such as solid propellant technology, accuracy and MIRVing (the development of multiple, independently targetable reentry vehicles). In part, there may have been an element of traditional Soviet emphasis on mass and size. But it is hard to avoid the conclusion that an important factor was the reading the Soviet leaders gave to the Cuban missile crisis and, to a lesser extent, the Berlin crisis. In the latter case, Khrushchev had briefly sought to exploit the first Soviet rocket firings of 1957—by a series of threats to Berlin beginning in late 1958—but then found that the West stood firm and that the United States quickly moved to reestablish its strategic superiority beyond doubt. And in the Cuban missile case, the very

* "Throw-weight" is a measure of the weight of effective payload that can be delivered to an intended distance. In the case of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs), the throw-weight is a direct measure of such a payload in terms of the potential power of the missiles' boosters. In view of the more variable loads carried by heavy bombers, a formula for equivalence is needed to take account of all factors including explosive power. This point is addressed in footnote 16.

introduction of the missiles into Cuba in the fall of 1962 must have reflected a desire to redress the balance by quick and drastic action, while the actual outcome of the crisis seemed to the Soviet leaders to spell out that nuclear superiority in a crunch would be an important factor in determining who prevailed.

Harking back to the Soviet penchant for actually visualizing what would happen in the event of nuclear war, it seems highly likely that the Soviet leaders, in those hectic October days of 1962, did something that U.S. leaders, as I know from my participation, did only in more general terms—that is, ask their military just how a nuclear exchange would come out. They must have been told that the United States would be able to achieve what they construed as victory, that the U.S. nuclear posture was such as to be able to destroy a major portion of Soviet striking power and still itself survive in a greatly superior condition for further strikes if needed. And they must have concluded that such a superior capability provided a unique and vital tool for pressure in a confrontation situation. It was a reading markedly different from the American internal one, which laid much less stress on American nuclear superiority and much more on the fact that the United States controlled the sea lanes to Cuba and could also have expected to prevail in any conflict over Cuba waged with conventional arms.*

One cannot prove that this was the Soviet reasoning. But the programs they set under way about 1962—above all the new family of weapons systems, embodying not only numbers and size but also greatly advanced technology, the development and deployment of which began to be evident beginning in 1971 but which must have been decided upon some years earlier—seem to reflect a fundamental state of mind on the Soviet side that contains no doubt as to the desirability of a war-winning capability, *if feasible*. Believing that evacuation, civil defense and recuperation measures can minimize the amount of damage sustained in a war, they conclude that they should be prepared if necessary to accept the unavoidable casualties. On the other hand, the loss of a war would be irretrievable. Therefore, the best deterrent is a war-winning capability, if that is attainable.

There have been, and I believe still are, divisions of opinion on the Soviet side as to whether such a capability is feasible. There are those who have argued that the United States is a tough opponent with great technical expertise and that the United States can be expected to do whatever is necessary to deny such a war-winning capability to the

* See Maxwell D. Taylor, "The Legitimate Claims of National Security," *Foreign Affairs*, April 1974, p. 582.

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Soviet side. Others have taken the view that the developing correlation of forces—social, economic and political as well as military and what they call the deepening crisis of capitalism—may prevent the United States and its allies from taking the necessary countermeasures and that the target of a war-winning capability, therefore, is both desirable and feasible. Again, this is not to say that Soviet leaders would desire to initiate a nuclear war even if they had a war-winning capability. They would, however, consider themselves duty bound by Soviet doctrine to exploit fully that strategic advantage through political or limited military means.

IV

The SALT negotiations got under way in late 1969. As a participant in those talks from then until mid-1974, I have described elsewhere some of the difficulties that attended the U.S. side.¹ What was most fundamental was that the U.S. delegation sought at every level and through every form of contact to bring home to the Soviet delegation, and the leaders behind it, the desirability of limitations which would assure "crisis stability" and "essential equivalence"—and that the Soviet side stoutly resisted these efforts.

Indeed, the negotiations very early revealed other major stumbling blocks. One, in particular, revolved around the Soviet conception of "strategic parity." In the SALT negotiations the U.S. delegation consistently argued for the acceptance by both sides of the concept of "essential equivalence." By that we meant that both sides did not have to be exactly equal in each component of their nuclear capabilities but that overall the nuclear strategic capability of each side should be essentially equal to that of the other and at a level, one could hope, lower than that programmed by the United States. The Soviets have never accepted this concept, but have argued instead for the concept of "equal security taking into account geographic and other considerations." In explaining what they meant by "geographic and other considerations," they said that, "The U.S. is surrounded by friendly countries. You have friends all around the oceans. We, the U.S.S.R., are surrounded by enemies. China is an enemy and Europe is a potential enemy. What we are asking for is that our security be equal to yours taking into account these considerations." They never went so far as to say that this really amounts to a requirement for Soviet superiority in capabilities over the United States, the U.K., France and China simultaneously, but watching the way they added things up

¹Paul H. Nitze, "The Strategic Balance: Between Hope and Skepticism," *Foreign Policy*, Winter 1974-75, pp. 136-56.

and how they justified their position, this is what it boiled down to.

Yet the two sides were able to reach agreement in May of 1972 on stringent limitations on the deployment of ABM interceptor missiles, ABM launchers and ABM radars and on an Interim Agreement temporarily freezing new offensive missile-launcher starts.

After the May 1972 signing of the ABM Treaty and the Interim Agreement, it turned out that the two sides had quite different views as to how the negotiating situation had been left. On the U.S. side, we told the Congress that the Interim Agreement was intended to be merely a short-term freeze on new missile-launcher starts, and that this, together with the ABM Treaty, should create favorable conditions for the prompt negotiation of a more complete and balanced long-term agreement on offensive strategic arms to replace the Interim Agreement and be a complement to the ABM Treaty. Both sides had agreed promptly to negotiate a more complete agreement to replace the Interim Agreement. And the Interim Agreement specifically provided that its provisions were not to prejudice the scope or terms of such a replacement agreement. We thought such a replacement agreement should be based, as was the ABM Treaty, on the principles of equality in capabilities, greater stability in the nuclear relationship between the two sides, and a mutual desire to reduce the resources committed to strategic arms.

However, the Soviet Union had a quite different view. Its negotiators held that in accepting the Interim Agreement we had conceded that the Soviet Union was entitled to an advantage for an indefinite time of some 40 percent in the number of missile launchers and something better than double the average effective size, or throw-weight, of their missiles over ours. In working out a more complete and longer term agreement, in their view, all that was necessary was to add strict and equal limits on bombers and their armaments, provide for the withdrawal of our nuclear forces deployed in support of our allies capable of striking Soviet territory, and halt our B-1 and Trident programs but not the "modernization" of their systems. The difference of position between the two sides was such that it was difficult to see how agreement could be reached.

In the Vladivostok Accord of December 1974 the Soviets did make concessions from their past extremely one-sided negotiating demands. Those concessions were greater than many in the U.S. executive branch expected. However, does the Accord promise to result in achieving the objectives which the United States has for many years thought should be achieved by a long-term agreement on offensive forces? Those objectives were parity, or essential equivalence, between

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the offensive capabilities on the two sides, the maintenance of high-quality mutual deterrence and a basis for reducing strategic arms expenditures. I believe it does not.

The Vladivostok Accord, in essence, limits the total number of strategic launchers—ICBMs, submarine-launched ballistic missiles (SLBMs) and heavy strategic bombers, to 2,400 on both sides, and the number of MIRVed missile launchers to 1,320 on both sides. It limits the Soviet Union to the number of modern large ballistic launchers (MLBMs) that they now have, while prohibiting the United States from deploying any modern launchers in this category." The Accord calls for air-to-surface missiles with a range greater than 600 kilometers, carried by heavy bombers, to be counted against the 2,400 ceiling. The treaty would allow freedom to mix between the various systems subject to these limitations.

As this article goes to press, there still remain some things to be cleared up: Secretary Kissinger has said that there was a misunderstanding concerning air-to-surface missiles (ASMs), that our understanding was that only *ballistic* air-to-surface missiles of greater than 600-kilometer range are to be included in the 2,400 launcher limit, not *cruise* missiles.¹¹ That is being argued between the two sides at the present time. There is also a question about mobile missiles, particularly land-mobile missiles: Should they be banned or should they be permitted and counted against the 1,320 and 2,400 ceilings? And there is the open question of what constitutes a "heavy bomber." The Soviets are building a plane called the "Backfire" whose gross take-off weight is three-quarters that of the B-1 and which is two and a half times as big as our FB-111. It is a very competent plane, more competent than some of the planes they now agree should be defined to be heavy bombers. The Soviets say the Backfire should not be included

¹¹ There has been no agreed definition of a heavy ballistic missile. However, both sides acknowledge that the SS-9 and the SS-18 are MLBMs and that the U.S. Titan missile, while it is considered heavy, does not fall within the definition of "modern." The U.S. has no launchers for MLBMs and is prohibited from converting any of its silos to such launchers. The Soviets are estimated to have had 308 launchers for MLBMs and are permitted to convert the SS-9 launchers into launchers for the even larger and much more capable SS-19.

¹² There are several relevant points on the 600 km range and cruise vs. ballistic ASM questions. The inclusion of cruise missiles as well as ballistic missiles in the aggregate would offer a distinct advantage to the U.S.S.R. In the first place, cruise missiles with a range greater than 600 km. would significantly contribute to U.S. bomber penetration in the face of the strong Soviet anti-aircraft defenses. Furthermore, the United States needs longer range cruise missiles to reach meaningful targets within the opponent's interior than does the Soviet Union. Secondly, the Soviets now have cruise missiles of large size with large conventional warheads having a range close to 600 km. With smaller nuclear warheads their range could be more than doubled. It is not possible to verify the substitution of nuclear warheads for conventional ones, or to tell armed cruise missiles from unarmed ones. In any case, a single cruise missile cannot be equated with a Soviet ICBM carrying 30 times as much warhead weight.

in the category of heavy bombers because "we don't intend to use it in that role." However, it can in fact carry, even without refueling (and it is equipped to be refueled), a significant payload to intercontinental distances if the aircraft is recovered in a third country. The way the Vladivostok Accord reads, air-to-surface missiles in excess of 600 kilometers in range, if not carried on a heavy bomber, are not required to be counted at all. So Backfires and FB-111s with long-range missiles would not count in any way against anything. These problems must be resolved in order to have a meaningful agreement.

Then there are the problems of verification. Messrs. Kissinger and Gromyko have been trying to work out a compromise on the verification issue. I personally take the verification issue less seriously than most because the limits are so high that what could be gained by cheating against them would not appear to be strategically significant.¹² However, we should be careful not to establish a precedent which would cause trouble if more meaningful limitations were agreed upon.

A notable feature of the Vladivostok Accord is that it does not deal with throw-weight. The agreement would not effectively check the deployment of the new Soviet family of large, technically improved and MIRVed offensive missiles. While both sides are permitted equal numbers of MIRVed missiles, the new Soviet SS-19s have three times the throw-weight of the U.S. Minuteman III, and the new SS-18s, seven times. What this comes down to is that under the Accord the Soviets can be expected to have a total of about 15 million pounds of missile throw-weight and bomber throw-weight equivalent. If the Congress goes forward with the B-1 and the Trident system but the United States does not add further strategic programs, the Soviets can be expected to end up with an advantage of at least three-to-one in missile throw-weight and of at least two-to-one in overall throw-weight, including a generous allowance for the throw-weight equiv-

¹² The significance of verifiability is a function not only of the confidence one can have in verifying a particular number but of the strategic significance of the number being verified. Fixed ICBM silos are large and the number deployed is therefore readily verifiable, however, the throw-weight of the missiles which can be launched from such silos can vary by a factor of ten.

The provision in the SALT I Interim Agreement that the interior dimensions of silos not be increased by more than 15 percent was an attempt to get at this problem. However, the volume of a missile which can be launched from a silo of given interior dimensions can still vary by a factor of two or three, and the throw-weight of a missile with a given volume can vary by a factor of two. Even if the probable error in directly verifying a throw weight limitation were 20 percent, such a limitation would be strategically far more significant than any of the preceding limitations.

In addition to throw-weight, there are other significant strategic factors, such as the survivability of the launcher through mobility or hardening, and the accuracy, reliability, and number of RVs (reentry vehicles) carried by a MIRVed missile. None of these other factors is limited under the Vladivostok Accord and, in any case, they are inherently difficult to verify.

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alent of heavy bombers, and two-to-one or three-to-one in MIRVed missile throw-weight. This disparity leaves out of consideration the Backfire, the FB-111, and the highly asymmetrical advantage in air defenses that the Soviet Union enjoys."

Thus, the Vladivostok Accord, while a considerable improvement upon the prior negotiating positions presented by the Soviet Union, continues to codify a potentially unstable situation caused by the large disparity in throw-weight, now being exploited by Soviet technological improvements.

V

The prospects for SALT III center on reductions in the strategic forces on both sides, an aim of the SALT talks since their inception. My personal view is that meaningful reductions are highly desirable, and that the aim of reductions should be to increase strategic stability. But this aim is not served by reducing numbers of launchers, unless throw-weight is also reduced and made more equal."

The agreed reduction of the throw-weight of large, land-based MIRVed missiles, however, would increase stability. I see no reason why the Soviet Union needs to replace its SS-9s with SS-18s, nor why it needs to replace a large number of its SS-11s with SS-19s. Although it is perfectly feasible and permissible under the Vladivostok Accord for us to develop missiles of equally large or even greater throw weight than the SS-19s and fit them in Minuteman II silos, would it not be far better for both sides if there were sub-limits of, say, 50 on the number of SS-18s the Soviets were permitted to deploy and 500 or less on the number of SS-19 and SS-17 class ICBMs that either side was permitted to deploy? Even in a context of no other changes in the postures of the two countries, the reduction in missiles to these numbers would change the missile throw-weight asymmetry to one-and-a-half to one.

It might then be more feasible to work out subsequent reductions in numbers of vehicles which would include the Soviet older un-MIRVed missiles, such as the SS-9, along with our Minuteman II and Titan. But in the absence of throw-weight limitations of some

"In mid 1973 the United States had 402 fighter interceptors and 481 surface-to-air missiles, compared to the Soviet Union's 3,000 fighter interceptors and 10,000 surface-to-air missiles. Edward Luttwak, *The U.S.-U.S.S.R. Nuclear Weapons Balance*, The Washington Papers, Beverly Hills: Sage Publications, 1974.

"Indeed, if total throw weight is not reduced while the number of launchers is, the fewer launchers become more vulnerable and crucial to each side and crisis stability is actually lessened. See Lt. Gen. (then Col.) Glenn A. Kent, "On the Interaction of Opposing Forces under Possible Arms Agreements," Occasional Papers in International Affairs, No. 5, Center for International Affairs, Harvard University, March 1963.

sort, reduction per se will not improve stability.

However, the Russians are opposed to considering throw-weight limitations and have also taken the position that a future negotiation for reductions has to take into account all forward-based systems—all the systems we have in Europe and in East Asia, and on aircraft carriers. Thus, it is hard to see how we can have high hopes of getting anything in SALT III that will provide relief for the anticipated strain on the U.S. strategic posture as the Soviet deployments proceed and as their accuracy improves.

VI

The country as a whole has looked at strategic nuclear problems during the last six years in the context of SALT, hoping to make the maintenance of our national security easier through negotiations. It now appears, however, for the reasons outlined above, that we are not likely to get relief from our nuclear strategic problems through this route. Therefore, we have to look at our strategic nuclear posture in much the way we used to look at it before the SALT negotiations began and determine what is needed in the way of a nuclear strategy for the United States and what kind of posture is needed to support it. A fundamental aim of nuclear strategy and the military posture to back it up must be deterrence: the failure to deter would be of enormous cost to the United States and to the world.

Once again, two important distinctions should be borne in mind: the distinction between the concept of "deterrence" and the concept of "military strategy," and the accompanying distinction between "declaratory policy" and "action policy." Deterrence is a political concept; it deals with attempts by indications of capability and will to dissuade the potential enemy from taking certain actions. Military strategy deals with the military actions one would, in fact, take if deterrence fails. A responsible objective of military strategy in this event would be to bring the war to an end in circumstances least damaging to the future of our society.

From the U.S. standpoint, just to level a number of Soviet cities with the anticipation that most of our cities would then be destroyed would not necessarily be the implementation of a rational military strategy. Deterrence through the threat of such destruction thus rests on the belief that in that kind of crisis the United States would act irrationally and in revenge. Yet serious dangers can arise if there is such a disparity between declaratory deterrence policy and the actual military strategy a nation's leaders would adopt if deterrence fails—or if there is a belief by the other side that such a disparity would be

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likely. I think former Secretary James Schlesinger's flexible response program was, in effect, an attempt to get our declaratory policy closer to a credible action policy and thus improve deterrence.

Ultimately, the quality of that deterrence depends importantly on the character and strength of the U.S. nuclear posture versus that of the Soviet Union. In assessing its adequacy, one may start by considering our ability to hold Soviet population and industry as hostages, in the face of Soviet measures to deter or hedge against U.S. retaliation directed at such targets.

In 1970 and 1971—when the focus was almost exclusively on “mutual assured destruction”—the congressional debates on whether or not to deploy a U.S. anti-ballistic missile system recognized clearly the importance to deterrence of hostage populations. Critics of the ABM argued—and with decisive impact on the outcome of the debate—that an effective ABM defense of urban/industrial centers could be destabilizing to the nuclear balance: if side *A* (whether the United States or the U.S.S.R.) deployed an ABM defense of its cities, side *B* could no longer hold side *A*'s population as a hostage to deter an attack by *A* on *B*. And in 1972 the same argument carried weight in the negotiation and ratification of the ABM limits in the SALT I agreements.

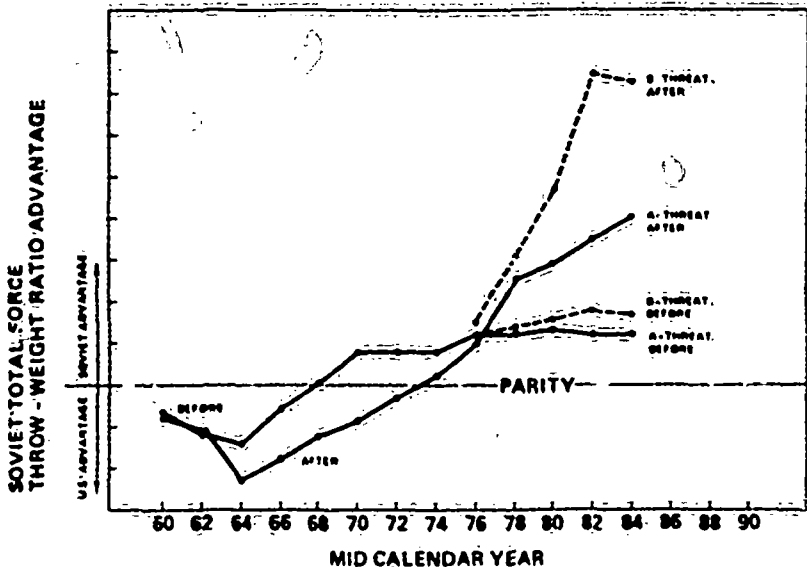
Yet today the Soviet Union has adopted programs that have much the same effect on the situation as an ABM program would have. And as the Soviet civil defense program becomes more effective it tends to destabilize the deterrent relationship for the same reason: the United States can then no longer hold as significant a proportion of the Soviet population as a hostage to deter a Soviet attack. Concurrently, Soviet industrial vulnerability has been reduced by deliberate policies, apparently adopted largely for military reasons, of locating three-quarters of new Soviet industry in small and medium-sized towns. The civil defense program also provides for evacuation of some industry and materials in time of crisis.

In sum, the ability of U.S. nuclear power to destroy without question the bulk of Soviet industry and a large proportion of the Soviet population is by no means as clear as it once was, even if one assumes most of U.S. striking power to be available and directed to this end.

A more crucial test, however, is to consider the possible results of a large-scale nuclear exchange in which one side sought to destroy as much of the other side's striking power as possible, in order to leave itself in the strongest possible position after the exchange. As already noted, such a counterforce strategy appears to fit with Soviet ways of thinking and planning; it is a strategy we must take into account.

TABLE I

Soviet - U.S. Throw-Weight Ratios

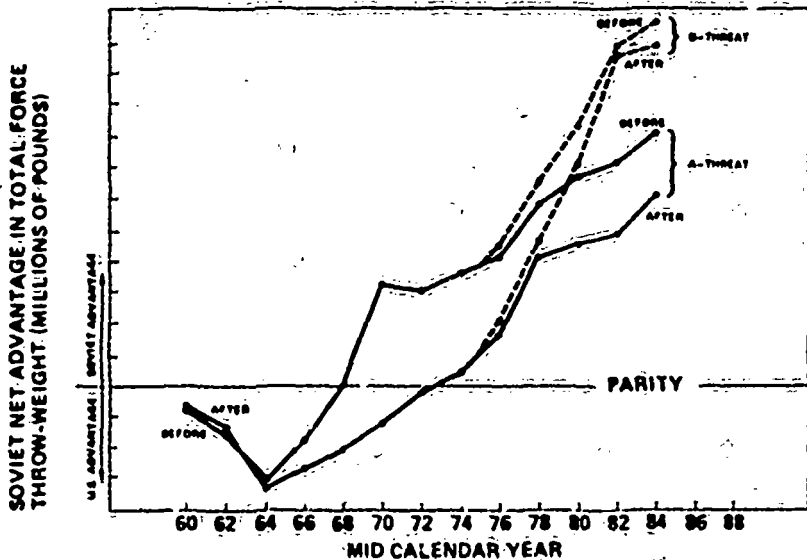


Tables I and II, on these two pages, apply this test over a period of years running from 1960 to (as it happens) 1984. For past periods, fairly assured estimates are available for both sides. For future years, a median estimate of U.S. programs, based on published data, has been used, while on the Soviet side there are two alternative projections— an "A threat" based on a representative estimate of Soviet force deployments and accuracy capabilities, and a "B-threat" reflecting the possibility of increased Soviet emphasis on accuracy and other strategic force factors. Both forces are assessed in terms of total available throw-weight, measuring this directly for assumed missile inventories and making full allowance for the bomber equivalent of missile throw-weight for both sides.¹⁴

The Tables assume an exchange in which the Soviet Union has attacked U.S. forces, and the United States has retaliated by trying to

¹⁴ A B-52 has been assigned an equivalent throw-weight of 10,000 lbs. and a B-1 a cut 19,000 lbs. The SRAM air-to-surface missile has a yield about equal to that of a Minuteman III warhead; hence, for every three SRAMs carried by a bomber, that bomber is given a throw-weight equivalent equal to the throw-weight of one Minuteman III. Laydown bombs are assumed to have roughly the yield of Minuteman II; hence, for each laydown bomb carried by a bomber it is given a throw-weight equivalent equal to the throw-weight of a Minuteman II. The alert bomber force is assumed to be 40 percent of the B-52 inventory and 60 percent of the B-1 inventory, degraded to incorporate penetration factors.

TABLE II
Soviet — U.S. Throw-Weight Differentials



reduce Soviet strategic throw-weight to the greatest extent possible. To assess the opposing forces *before* attack in terms of their relative throw-weight is of course only a partial measure of their comparative original capability. In working out what would actually happen in the assumed exchange, full account has been taken of all relevant factors—in particular the number, yield, accuracy and reliability of the reentry vehicles associated with that throw-weight, and the hardness of the targets against which they are assumed to have been targeted.

It is the situation *after* attack, of course, that is most important. And here, since the targets remaining after the exchange would almost all be soft ones, missile accuracy and other refinements in the original postures no longer have the same significance. Surviving throw-weight thus becomes an appropriate *total* measure of the residual capability on both sides.

As worked out by Mr. T. K. Jones, who served as my senior technical advisor when I was a member of the U.S. SALT delegation, the results of such an assessment are shown in Table I, expressed in terms of the ratios, and Table II, expressed in terms of the absolute units of weight—by which one side exceeds the other before and

after attack in the various periods and alternative cases examined."

Based on this method of assessment, the United States in 1960 held a slight but increasing advantage over the Soviet Union, and this advantage became greatest in about mid-1964. Thereafter, however, Soviet programs—greatly accelerated, as earlier noted, after the Cuban missile crisis—started to reverse the trend, so that by mid-1968 the total deployed throw-weights on both sides, before a hypothetical nuclear exchange, were roughly equal. However, as the "after" curve shows, the U.S. operational military advantage persisted for some time thereafter, offsetting the Soviet superiority in deployed throw-weight. For example, if in 1970 the Soviets had attacked U.S. forces, their entire prewar advantage would have been eliminated, leaving the United States with substantial superiority at the end of the exchange. However, this situation began to be reversed in 1973, with the Soviets gaining the military capability to end an exchange with an advantage in their favor. Moreover, in 1976 the "before" and "after" curves of Table I cross, signifying that the Soviets could, by initiating such an exchange, increase the ratio of advantage they held at the start of the exchange. By 1977, after a Soviet-initiated counterforce strike against the United States to which the United States responded with a counterforce strike, the Soviet Union would have remaining forces sufficient to destroy Chinese and European NATO nuclear capability, attack U.S. population and conventional military targets, and still have a remaining force throw-weight in excess of that of the United States. And after 1977 the Soviet advantage after the assumed attack mounts rapidly.

In addition to the ratios and absolute differences that apply to the remaining throw-weights of the two sides, there is a third factor which should be borne in mind. That factor is the absolute level of the forces remaining to the weaker side. If that absolute level is high, continues under effective command and control, and is comprised of a number of reentry vehicles (RVs) adequate to threaten a major portion of the other side's military and urban/industrial targets, this will be conducive to continued effective deterrence even if the ratios are unfavorable. These considerations reinforce the desirability of survivable systems and methods of deployment.

"I regret that, even if space permitted, the full assumptions used in Mr. Jones' study cannot be spelled out here. Security considerations necessarily enter in for some of the underlying data. I have myself gone over Mr. Jones' data and assumptions with care and believe that they represent a careful and objective analysis of the relevant factors. Above all, since his methods are self-consistent from one period to the next, they show a valid trend-line and pace of change—which I believe the more expert readers of this article will find conform to their more general judgments.

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In sum, the trends in relative military strength are such that, unless we move promptly to reverse them, the United States is moving toward a posture of minimum deterrence in which we would be conceding to the Soviet Union the potential for a military and political victory if deterrence failed. While it is probably not possible and may not be politically desirable for the United States to strive for a nuclear-war-winning capability, there are courses of action available to the United States whereby we could deny to the Soviets such a capability and remove the one-sided instability caused by their throw-weight advantage and by their civil defense program.

To restore stability and the effectiveness of the U.S. deterrent: (1) the survivability and capability of the U.S. strategic forces must be such that the Soviet Union could not foresee a military advantage in attacking our forces, and (2) we must eliminate or compensate for the one-sided instability caused by the Soviet civil defense program. Specifically, we must remove the possibility that the Soviet Union could profitably attack U.S. forces with a fraction of their forces and still maintain reserves adequate for other contingencies.

As to the civil-defense aspect, the absence of a U.S. capability to protect its own population gives the Soviet Union an asymmetrical possibility of holding the U.S. population as a hostage to deter retaliation following a Soviet attack on U.S. forces. Although the most economical and rapidly implementable approach to removing this one-sided instability would be for the United States to pursue a more active civil defense program of its own, such a program does not appear to be politically possible at this time. Its future political acceptability will be a function of the emerging threat and its appreciation by U.S. leadership and by the public.

Two more practicable avenues of action suggest themselves. First, all of the options which would be effective in diminishing the one-sided Soviet advantage involve some improvement in the accuracy of U.S. missiles. Differential accuracy improvements can, at least temporarily, compensate for throw-weight inequality.

This is a controversial issue which has been studied extensively. The results of one such study by a member of Congress are shown in the *Congressional Record* of May 20, 1975. According to that study the United States presently holds a 4:1 superiority in the hard-target kill capability of missile forces. The Congressman notes in his opposition to a U.S. high-accuracy maneuvering reentry vehicle (MaRV) program that MaRV would by the late 1980s improve U.S. accuracy to .02 n.m. (120 feet), incorrectly estimating that this would increase

the U.S. advantage to 7:1 over the U.S.S.R. assuming the latter was unable to develop MaRV by that time. However, the Congressman's data also predict that the hard-target kill capability of the Soviet missile force will by the 1980s have increased 100-fold, so that if the United States took no action to improve the accuracy of its missiles, the Soviet Union would have an advantage of 25:1. While it is unnecessary to equip more than a portion of U.S. missiles with high-accuracy RVs, it is clear that substantial accuracy improvements are essential to avoid major Soviet superiority in a critical respect.

Others argue that improvements in U.S. missile accuracy would be "destabilizing." More specifically, such programs "could spur Soviet countermeasures such as new programs to increase their second-strike capabilities by going to (1) more sea-launched strategic missiles, (2) air- and sea-launched cruise missiles, (3) expanded strategic bomber forces, and (4) mobile ICBMs."¹¹ These arguments ignore the central fact that deterrence is already being seriously undermined by unilateral actions of the Soviet Union. Hence, further self-restraint by the United States cannot but worsen this condition.

Moreover, the Soviet programs cited as consequences of U.S. accuracy improvement are in fact stabilizing rather than destabilizing. Under the SALT agreements on force ceilings, such reactions would compel offsetting reductions in the Soviet silo-based ICBM force, thereby reducing their total force throw-weight. Moreover, the replacement ICBM systems are not likely to achieve accuracy equal to that of the silo-based ICBMs, while throw-weight moved to bombers and cruise missiles, because of the long flight time to targets, cannot be effectively used in a first-strike counterforce role.

In sum, even on the information furnished by those generally opposing improved accuracy of U.S. missiles, improvement is necessary to avoid a major Soviet advantage, and the logical Soviet counter to such improvements would move the Soviets in a direction which would stabilize the strategic relationship and reduce the Soviet throw-weight advantage.

Second, the prospective Soviet advantage could be offset by measures to decrease the vulnerability of U.S. strategic nuclear forces. Here there are several ongoing programs already under way, notably the development of the Trident submarine and the B-1 bomber; both these delivery systems will be inherently less vulnerable to a counterforce attack than fixed ICBM installations, the submarine by reason of its mobility at sea and the B-1 by virtue of its mobility and escape

¹¹ Additional views of Representative Schneider, "Alternative Defense Posture Statement," Report 94-199 of House Armed Services Committee, May 10, 1975, p. 130.

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speed as well as the potential capacity to maintain a portion of the B-1 force airborne in time of crisis. In addition, programs to increase the pre-launch survivability of U.S. bomber forces generally, as well as programs to increase air defense capability through the so-called AWACS system, operate to reduce vulnerability of the total U.S. force. To a considerable extent, however, these programs are already taken into account in the calculations shown on Tables I and II—if they were to be delayed, the effect would be negative, and the contrary if they were to be stepped up and accelerated.

I believe, however, that these measures do not go far enough. The most vulnerable U.S. delivery system today is that of our fixed and hardened ICBM installations, including Minuteman silos. Under present trends, it is only a question of time until a combination of the large throw-weight available to the Soviets and improved accuracy will threaten the destruction of a high percentage of these installations—so that today there is considerable talk in some quarters of actually phasing out U.S. ICBM installations.

I believe such action would be unwise, and that it is entirely feasible, at not excessive cost, to adopt a new system of deployment that would not only permit the retention of our ICBMs—which contribute heavily to the total U.S. throw-weight—but would actually make these a more critical and effective component of the U.S. striking force. The system that would accomplish these ends would be a proliferation of low-cost shelters for what is called a multiple-launch-point system. The essence of such a system would be to construct a large number of shelter installations, so that the smaller number of actual missile launchers could be readily moved and deployed among these installations on a random pattern deliberately varied at adequate intervals of time.

The ingredients for such a system are, I believe, already in existence, notably through the availability of sufficiently large areas of western desert land now owned by the Department of Defense. On this land there could be created a large number of hardened shelters, or alternatively the missiles themselves could be encased in hardened capsules redeployable among a large number of "soft" shelters. Preliminary study indicates that the research, development and procurement costs of a system along these lines would average approximately \$1.5 billion a year in 1975 dollars over the next eight to ten years. Inasmuch as the current level of obligatory authority for strategic weapons systems is on the order of \$7 billion per year—much less, as already noted, than the comparable amounts obligated annually in 1956-62—I believe this is a cost we should be prepared to accept.

The objective of creating such a new system of deployment would be to greatly increase the throw-weight costs to the Soviets of destroying a substantial portion of our deterrent forces. This is achieved with a multiple launch-point system, since in order to destroy the system virtually all of the relevant shelter installations would need to be destroyed. There would be many more hardened shelters or encapsulated missiles than the present number of fixed installations, so that the Soviets would be required to commit a larger portion of their throw-weight to this task than they would to the task of attacking fixed installations—the trade-off of U.S. throw-weight destroyed to Soviet throw-weight used would greatly favor the United States. Thus the Soviet advantage in a counterforce exchange would be drastically reduced or eliminated.

Furthermore, I believe that such a U.S. move would be likely to lead to Soviet countermoves that would have a constructive impact on the overall balance. The logical answer to such a U.S. move would be for the Soviet side to substitute either multiple launch-point missiles or SLBMs for a portion of their large fixed ICBMs. They would thereby increase the survivability of their systems, but at the cost of substantially reducing their throw-weight advantage. Such moves by both sides would greatly improve crisis stability and thus significantly reduce the risk of a nuclear war.

In essence, the multiple launch-point idea is a method of preserving and increasing the effectiveness of land-based systems by making them partially mobile. It is, however, necessary to take account of the usual argument advanced for banning land-based mobile missile systems. This argument is that it is more difficult to verify with confidence the number of mobile and thus redeployable launchers deployed by either side than it is to verify the number of fixed silos. The merit of this argument fades in a situation where up to 10 or 12 million pounds of MIRVed throw-weight can be expected to be available to the Soviet side under the limits contemplated by the Vladivostok Accord. With improved accuracy, less than four million pounds of MIRVed throw-weight could threaten the destruction of a high percentage of the fixed silos on the U.S. side. No practicable addition through unverified mobile launchers to the 10 to 12 million pounds of throw weight permitted the Soviet side would compensate strategically for the additional throw-weight requirement that a U.S. multiple launch-point system would impose. A significant portion of a U.S. multiple launch-point system should survive even if the Soviet Union were to devote to the task of attacking it double the four million pounds of MIRVed throw-weight it would have to allocate to the

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destruction of our Minuteman silos."

Undoubtedly, there are other programs which would also be necessary. In particular, it would seem to be essential, if the Soviet Union is to be permitted an unlimited number of Backfires, that we not grant them a free ride for their bomber forces. This would require a reversal of congressional action limiting support for the AWACS program. But taking everything into consideration, the magnitude of the U.S. effort required would be far less than that which we undertook in the 1957-1962 period in response to Sputnik and the then-threatened vulnerability of our bomber force.

VIII

Some of my friends argue that those knowledgeable about such matters should bear in mind the horrors of a nuclear war, and should call for U.S. restraint in the hope the U.S.S.R. will follow our lead. Having been in charge of the U.S. Strategic Bombing Survey team

¹⁰ Under the Vladivostok Accord, both sides are permitted 1,320 MIRVed missile launchers. The maximum MIRVed throw-weight the Soviets could obtain within this limit with the missiles they are currently testing and beginning to deploy is:

4,500,000 pounds on 308 SS-18s (about 15,000 pounds each)

7,100,000 pounds on 1,012 SS-19s (about 7,000 pounds each)

for a total MIRVed throw-weight of 11.6 million pounds. However, it is unlikely that the Soviets will reach this maximum, as they are currently deploying some SS-17s, which will have a throw-weight of about 5,000 pounds, and they may choose not to MIRV all of their SS-18s. A more likely figure is less than ten million pounds of MIRVed throw-weight.

A reliable megaton-range RV with a CEP (circular error probable, a measure of accuracy) of 0.125 nautical miles has a probability of damage of 85 percent against a silo of 1,500 psi (pounds per square inch) hardness. The targeting of two such RVs on the silo would give a probability of damage of about 92 percent taking into account both reliability and accuracy. An SS-18 missile may have up to eight megaton-range RVs (International Institute for Strategic Studies, *The Military Balance, 1974-75*); thus a megaton-range RV may require around 2,000 pounds of throw-weight. The net throw-weight required, then, to threaten 92 percent destruction of 1,000 hard silos would be approximately four million pounds, assuming the Soviets achieve CEPs averaging an eighth of a mile.

A multiple launch point ICBM system with 600-psi hard shelters or encapsulated missiles in soft shelters would require considerably more throw-weight for its destruction. To barrage attack such a mobile system deployed on 6,000 square nautical miles of land as an area target would require about 29,000 megaton-range RVs to achieve a 92 percent damage level. The throw-weight required for this force would be considerably above the Soviet available force. Even as low a damage level as 20 percent would require almost 4,000 megaton-range RVs, a throw-weight of at least eight million pounds.

Assuming the same factors for accuracy and reliability as used above in calculating the potential results of an attack on silo-based ICBMs, an equal probability of damage (85 percent for a single reliable RV) can be achieved against a 600-psi shelter with a 290 kiloton weapon. Since a Minuteman III, with a total of three RVs of less than 200-kt yield, has a throw-weight of about 2,000 pounds, an RV of 290-kt yield might require about 800 pounds of throw-weight. Thus a U.S. deployment of some 10,000 shelters would require eight million pounds of Soviet MIRVed throw-weight to threaten destruction of 92 percent of the multiple launch-point system. The entire ten million pound force would raise the level of destruction to only 77 percent. The cost of adding RVs to the Soviet attack force should be substantially greater than the cost to the United States of adding shelters. In any case, it would appear technologically infeasible to reduce the throw-weight required per RV to less than 300 pounds, even if accuracies were eventually to approach zero CEP.

of 500 physicists and engineers who measured the detailed effects of the two nuclear weapons used at Nagasaki and Hiroshima, the only two such weapons ever used in anger, and having been associated with many of the subsequent studies of the probable effects of the more modern weapons, I am fully sensitive to the first point. But to minimize the risks of nuclear war, it would seem to me wise to assure that no enemy could believe he could profit from such a war.

As to the second point, Helmut Sonnenfeldt, Counselor for the State Department, recently described the preconditions for the U.S. détente policy in the following terms:

The course on which we embarked requires toughness of mind and steadfastness of purpose. It demands a sober view not only of Soviet strengths but of our own. It is an attempt to evolve a balance of incentives for positive behavior and penalties for belligerence; the objective being to instill in the minds of our potential adversaries an appreciation of the benefits of cooperation rather than conflict and thus lessen the threat of war . . . Interests will be respected only if it is clear that they can be defended. Restraint will prevail only if its absence is known to carry heavy risks.²⁰

Unfortunately, I believe the record shows that neither negotiations nor unilateral restraint have operated to dissuade Soviet leaders from seeking a nuclear-war-winning capability—or from the view that with such a capability they could effectively use pressure tactics to get their way in crisis situations.

Hence it is urgent that the United States take positive steps to maintain strategic stability and high-quality deterrence. If the trends in Soviet thinking continue to evolve in the manner indicated by the internal statements of Soviet leaders, and if the trends in relative military capability continue to evolve in the fashion suggested by the prior analysis, the foundations for hope in the evolution of a true relaxation of tensions between the U.S.S.R. and much of the rest of the world will be seriously in doubt.

²⁰ Helmut Sonnenfeldt, "The Meaning of Détente," *Naval War College Review*, July-August 1975, pp. 3-8.

The following letter responds to a letter from a group of Stanford scientists which appeared in the Congressional Record for March 11, 1976 beginning at page S3304.

PAUL H. NITZE

1500 Wilson Blvd.
Suite 1500
Arlington, Va. 22209
February 23, 1976

The Honorable Adlai E. Stevenson
United States Senate
Washington, D. C. 20510

Dear Adlai:

I have studied with care the comments of the Stanford Arms Control and Disarmament group contained in their letter to you of January 23rd. In the introductory paragraphs they advance certain general propositions upon which I will comment at some length. In the succeeding paragraphs they offer a number of detailed comments which are, I believe, contrary to fact or based upon a misreading or distortion of what I have said. These I will deal with in some detail later.

In their opening substantive paragraph they suggest that there is an inconsistency between the views I participated in formulating in the 1950s and 1960s and those expressed in my current Foreign Affairs article. I believe this to be untrue. In an article published in 1960 under the title, "Political Aspects of a National Strategy," I concluded with the following paragraphs:

"What then should we do? I see no simple solution. In the first place, we have to have a secure deterrent force; this we are now trying to achieve. I would only wish that we were doing it faster. Secondly, we should continue to recognize that such a deterrent force, by itself, is inadequate and insecure foundation for policy and we need more. If we can see any possibility of working out reciprocal actions with the Russians whereby mutual deterrence can be made substantially more secure, we should continue to strive for that goal. If, however, we find the Communists have moved over to a harder line, I should think we should batten down the hatches and put a great deal more effort into striving for that military posture

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which, at a minimum, should persuade the Russians... that they had better negotiate with us for agreement rather than for the purpose of humiliating us or doing us in.

"In conclusion, I should point out that while we are wrestling with the politico-military foundations of our policy we cannot in any way neglect its other aspects. There is much to be done in the economic field, in the psychological and purely political fields, and in the quality of our diplomacy.

"Perhaps the most important point of all is that we restore precision and accuracy to our thinking about the issues of our policy as a nation and to the words we use in talking about them. Platitudes put out merely to ease the problems of one day can really do us in."

The point of my current article is that the evidence indicates the Soviets have moved over to a harder line and that we should, in fact, prudently "batten down the hatches."

Of course, nuclear weapons are different from conventional weapons. But does that mean that rational argument about them should be foregone and that we should rest upon emotion-based platitudes? I believe not. As to the last sentence of their first paragraph, I would refer them to the passage in my article beginning on page 231.

In their second paragraph they suggest that political persuasion is at the heart of all strategic doctrines and that my statements can have a negative impact on our credibility. In my article I make the point that deterrence deals with attempts by indications of capability and will to dissuade the potential enemy from taking certain actions. I find it impossible to believe that statements that nuclear war is unthinkable, and that one should not rationally discuss what capabilities are necessary to assure high quality deterrence, increase our credibility. To the contrary, it should be obvious that rational discussion based upon a determination to maintain high quality deterrence and action to give us the necessary capabilities are exactly what is needed to maintain our credibility.

In the latter portion of paragraph two they extend the application of their approach to allies and third countries

with particular reference to non-proliferation. It is in part due to a decrease in the credibility of U.S. power that certain countries are tending in the direction of attempting to put themselves in a position to have a nuclear deterrent of their own. The ultimate danger from proliferation would be realized if satellites of Moscow, protected by a Moscow possessed of effective strategic nuclear superiority, were then in a position to threaten the use of nuclear weapons in the manner that Cuban forces are now using Soviet supplied conventional weapons in Africa.

In the final sentence of their second paragraph, it said that discussion about the political and strategic "weakness" of our strategic posture is a product of a segment of American strategic thinkers, not of Soviet officials or responsible Soviet writers. This just isn't so. The consistent line of official writings within the Soviet Union is that there has been a significant shift, favoring the Soviet Union, in the correlation of forces and that "detente" is an American concession which has followed from a "realistic" appraisal of growing Soviet power.

Having dealt with the major premise of my Stanford friends that it is inconsistent and harmful to discuss nuclear strategic issues as they are discussed in my Foreign Affairs article, let me now address the secondary comments they make in the remainder of their letter.

The point made in the first and second sentences of their third paragraph is basically incorrect. Had we based our decisions either on an objective assessment of developing Soviet capabilities or on their publicly-stated intentions, the U.S. would be in a strategic position less unfavorable than we are today. Instead, we based decisions on American assumptions as to Soviet intentions. We assumed that the Soviets would curtail their weapons building programs once they reached parity. Many assumed that Soviet acceptance of the ABM Treaty meant that they accepted the concept of deterrence through mutually assured destruction. It was assumed, in spite of a Soviet indication to the contrary, that the Soviet Union would be restrained by the U.S. unilateral statements appended to the SALT I agreements. Some now argue that the Backfire bomber should be exempted from the SALT II limits because the Soviets, they say, do not intend to use it as a strategic weapon.

The last two sentences of the third paragraph are also incorrect. My quotations from Soviet leaders relate to their attitude toward detente. I believe they are representative;

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they were addressed to internal Soviet audiences, and cannot properly be labeled propaganda statements. For another selection, I refer readers to Theodore Draper's recent article in Commentary, entitled "Appeasement and Detente."

I believe the argument of my Stanford friends in the fourth paragraph is also incorrect. The Soviet MIRV proposal was quite unrealistic; it called for no limitation on further MIRV testing. It is virtually impossible to determine whether a deployed missile, once that type of missile has been tested in a MIRV mode, is MIRVed or not.

The statement in their fifth paragraph that the United States has not restrained its strategic technology pace is also incorrect. The United States has for many years restrained its strategic technology pace. Examples include the WS-120A ICBM, hard-rock silos, Mark-500 reentry vehicles, the Hard Site Defense System, and improved guidance systems for both ICBMs and SLBMs.

With respect to the argument in the last portion of the fifth paragraph, it should be noted that Dr. Schlesinger's posture statement of 1975 gave its warnings in terms of economic factors rather than the explicit military consequences noted in my article. However, the warnings of the posture statement are nonetheless there for those who would heed them.

Dr. Schlesinger, in his recent article (Fortune, February 1976), states that "at no point since the 1930s has the Western world faced so formidable a threat to its survival." Secretary of Defense Rumsfeld, in requesting an increased defense budget for FY 1977 indicated that cutting the proposed budget would risk starting the United States on the road to military inferiority. As my Stanford friends must well realize, the recent political climate has been against publication of explicit warnings. Indeed, as noted above, my Stanford friends argue that we should not discuss our weaknesses in public.

With respect to the next paragraph, one should note that the decisions of the 1960s were necessarily based on facts and estimates available at that time. I am sure that my Stanford friends would agree that today's decisions should be based on facts and estimates that are now available. We now know that the Soviets did not stop at a position of parity with the U.S. It is true that our decisions must weigh the survivability of U.S. retaliatory nuclear forces and the vulnerability of Soviet cities and industry. Today's decisions must recognize that the

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Soviets are continuing to undermine the survivability of U.S. forces and to reduce the vulnerability of their population and industry.

In the ninth paragraph it is stated that I concluded that minimum deterrence would, in fact, be useless. This is a misquotation. My conclusion as published is that "the effect of this level of deterrence would be to provide limited deterrence of a full-scale attack on the U.S. population. It would have less strength in deterring a Soviet attack on U.S. forces or on allies..."

In the middle of the ninth paragraph, my Stanford friends refer to recent Senate hearings. These hearings discussed extensively the possibility that the U.S. might be deterred from retaliation after a Soviet attack limited to the U.S. strategic forces. This possibility arises not from the disputed number of Americans who might be killed in the initial Soviet strike but from the 90 million additional number of Americans who would be killed if the U.S. retaliated and then the Soviets attacked U.S. cities. It is conceivable that those who now assume nuclear war to be unthinkable might, under those circumstances, conclude that continued survival of the remaining U.S. population would outweigh the need to avenge the deaths of those already killed. The assertion that 20 million Americans would be killed in the initial Soviet strike does not affect this issue. Using the same set of assumptions which produces the 20 million fatalities estimate, the number of fatalities which would follow from an attack on both forces and cities would total at least 110 million, still leaving a total of 90 million Americans as hostages.

In the latter portion of their ninth paragraph, it is asserted that I have ignored the retaliatory power of U.S. strategic aircraft and SLBMs. It is clearly stated in the article that the analysis includes not only the ICBMs but the SLBMs and strategic bombers of both sides. Furthermore, the analysis does not ignore the fact that the Soviets have chosen to place 75 percent of their nuclear yield in land-based ICBMs, whereas the United States has only 25 percent of that power in its Minuteman force.

The last sentence of paragraph eleven is a misstatement of what is said in the article.

Paragraph twelve incorrectly summarizes what I said on page 13 of my article with respect to flexible response.

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Paragraph thirteen draws an incorrect inference by taking from page 213 of my article the quotation dealing with a posture probably unattainable by the United States and combining it with another quotation from page 216, which deals with Soviet beliefs influencing their weapons and civil defense programs. Moreover, there is faulty logic in the construction of this inference. If a war-winning capability is the best deterrent, it would follow that possession of such a capability would reduce the likelihood of war to the lowest level, thereby reducing "the need to control the level of the disaster implied by nuclear war."

In paragraph fourteen, they quote a portion of a sentence from page 216 of my article. The full sentence reads: "But the programs they set under way about 1962--above all the new family of weapons systems, embodying not only numbers and size but also greatly advanced technology, the development and deployment of which began to be evident beginning in 1971 but which must have been decided upon some years earlier--seem to reflect a fundamental state of mind on the Soviet side that contains no doubt as to the desirability of a war-winning capability, if feasible." Clearly, the logic of that sentence does not "rest" on my subsequent observations concerning the Soviet civil defense program. Those observations do, however, support the point. Furthermore, no reports of statements by Soviet leaders to international audiences in recent years, insofar as I have seen them, imply that a nuclear war cannot be won. There are numerous statements, however, which imply the opposite.

With respect to my Stanford friends' argument in their paragraph fifteen, I find myself in deepest disagreement. They begin by excerpting a single sentence. The entire paragraph in my article reads as follows:

"Up to that point (the Cuban missile crisis) something approaching a war-winning capability seemed to most Americans the best possible form of deterrence, and thus desirable. However, as it became clear that the Soviet Union too was developing massive and survivable missile delivery capabilities, this view changed to the belief that even though a nuclear war might be won in a military sense, it could not be won in a political sense. That led to the further view that mutual deterrence through mutually assured destruction was the most feasible objective."

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They then suggest that a U.S. nuclear posture, such as it possessed at the time of the Cuban missile crisis, if it were attainable today, would not yield a stable world and would be an abomination to our allies and an invitation to proliferation. They base this view on their belief that any assumption that the U.S. will never abuse its military power is not acceptable in today's world. If one lacks confidence that the U.S. Government, with its democratic structure of checks and balances, is less likely than the Soviet Union to use its power wisely for the preservation and development of a reasonably tolerable world, there is no reasonable basis on which the issues I have discussed can take place. It is absurd to suggest that our power was an abomination to our allies at the time of the Berlin and Cuban missile crises. Today our allies are concerned, not by our excessive power, but by doubts as to its sufficiency. It is these same doubts, not fear of an excess of U.S. power, that stimulate the tendency toward nuclear proliferation.

The comments of my Stanford friends in paragraph sixteen regarding use of throw-weight as an index of capability indicate a failure to read the article on which they are commenting. Their comments relate only to the comparison of throw-weight which exists before an attack. The article clearly states that "to assess the opposing forces before an attack in terms of their relative throw-weight is, of course, only a partial measure of their comparative original capability." The article goes on to point out that "it is the situation after attack, of course, that is most important."

The situation after attack is necessarily based on what would actually happen in a nuclear exchange between the forces of the two sides. The article points out that in making this assessment "full account has been taken of all relevant factors-- in particular the number, yield, accuracy, and reliability of the reentry vehicles associated with that throw-weight, and the hardness (survivability) of the targets against which they are assumed to have been targeted."

While I believe, for reasons stated in the article, that the balance of throw-weight existing after an exchange is an appropriate total measure of residual military capability, I have also examined more sophisticated indices. One such index is known as "equivalent warheads." It takes into account the number, yield, and accuracy of the warheads and bombs on each side as well as the survivability characteristics of the targets against which these warheads could be used. Hence, "EW" recognizes

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in detail the elements of advantage believed to be held by both sides. Chart 3, attached, compares the trends in after attack throw-weight with the trend in after attack EW. As can be seen, the use of this more sophisticated index does not alter the situation portrayed in the charts used in the article.

It is difficult to understand my Stanford friends' remarks about the U.S. "enormous bomber throw-weight" since the article makes clear that the analysis includes the missile equivalent of this bomber throw-weight. Similarly, it is clear that the analysis is based on what the U.S. currently plans to do, not what we could do. My Stanford friends note that the U.S. could load our bombers differently and increase the throw-weight of our ICBMs by a large factor. However, these modifications alone would make little difference in the after attack throw-weight balance but would alter the before attack balance in a direction that would exacerbate the instability of the strategic relationship. My Stanford friends cite the Soviet conversion of SS-7 and SS-8 missile launchers to much smaller SLBM launchers as evidence that the Soviets don't regard throw-weight as the central measure of strategic power. However, while this conversion reduces Soviet before attack superiority, it increases Soviet after attack superiority.

In paragraph nineteen, my Stanford friends assert that my assessment of Soviet civil defense is "contradicted by facts" and that "there are important reasons why the civil defense issue has lain dormant ever since the backyard shelter scare in the U.S..." Since they do not cite these "facts" and "important reasons" it is not possible to comment on them or determine the relevance of reasons important within the United States to a Soviet program oriented to pre-attack evacuation and dispersal of population rather than to "backyard shelters."

I do not believe that citation of clerical errors in translating miles to kilometers is a reliable indication of the extent of effectiveness of the Soviet civil defense preparations. Moreover, inadequacy of Soviet shelter ventilation provisions is an easily corrected item and it is almost certain that, if this deficiency is indeed serious, the Soviets would have become aware of it during last summer's "military-sports" games. These exercises are reported to have included 23 million Soviet youths, of whom seven million participated in advanced activities which included shelter building.

In paragraph twenty, the assertion that "the Soviet program gives only minimal protection to their population" is false. U.S. estimates are that unless the U.S. deliberately attempts to maximize Soviet population losses, their evacuation program alone (without fallout shelters) would limit their fatalities to less than 10 million people. Similarly, a study by Stanford Research Institute contradicts their assertion that no civil defense program can be effective without extensive evacuation rehearsals.

It is also false to assert that "the Soviet military industrial base is totally exposed." The Soviet programs call for extensive provisions to enhance the survival of the industrial equipment essential to rapid recovery. Open literature indicates that industrial plants are subject to frequent drills involving the emplacement of protective means, fire-fighting, and simulated restoration. A U.S. study currently underway has developed preliminary indications that the Soviet protective means are particularly effective against the size warheads carried by the U.S. SLBMs. Intelligence briefings in this area are of limited value since the intelligence community has put a low priority on monitoring this area for many years.

It is incorrect to assert, as my Stanford friends do in paragraph twenty-one, that in the ABM Treaty the Russians agreed to keep themselves defenseless. The Russians limited only one particular form of defense, the only one in which the U.S. held a major technological lead. They refused to limit air defenses or anti-tactical ballistic missile defenses and agreed only to relatively ambiguous wording. Important parts of the ABM agreement, such as the definition of testing in an ABM mode, rest upon unilateral U.S. interpretive statements. Neither side considered limits on civil defense preparations which the Soviets accelerated after signing the ABM Treaty.

I concur with my Stanford friends' statement in paragraph twenty-two that our first priority must be to deter war by achieving a stable balance and that it should be our goal to have invulnerable deterrent forces on both sides. However, the analysis published in my article shows that the situation is now moving toward an unstable strategic balance, a principal reason being that the Russians are developing a counterforce capability such that by attacking the U.S. deterrent forces the Soviets would increase their ratio of superiority over the United States. My friends are inconsistent in this paragraph arguing in favor of invulnerable deterrent forces while later arguing against measures which would reduce the vulnerability of the most vulnerable element of our deterrent force.

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My Stanford friends, in pointing out in paragraph twenty-five that deployment of a multiple launch-point system would make it impossible to count ICBMs, create the inference that without such systems, ICBMs can be counted. This inference is incorrect; we have never been able to count ICBMs (as opposed to ICBM launchers) and do not expect to obtain such capability in the future. Moreover, if the Soviets elect to cheat and take simple precautions to conceal their actions, we may be unable to count all ICBM launchers.

My proposal is to create "a large number of hardened shelters, or alternatively, the missiles themselves could be encased in hardened capsules redeployable among a large number of 'soft' shelters." Their remark regarding the cost of shelters probably refers to the shelter designs which were studied ten years ago. Hardened shelters redesigned for the currently projected Soviet threat reduce by half the cost of shelters. I tend to favor the hard capsule-soft shelter concept because the shelter cost is estimated to be even lower--about one-tenth that of the old hard shelter. Moreover, for those concerned about verification, this latter concept permits counting the launchers using much the same principles now used to count SLBM launchers.

Because the issues discussed here impinge on the formidable threat to the survival of the Western world noted by Dr. Schlesinger, it is my hope that the issues will be treated in as objective and factual manner as possible.

Sincerely,

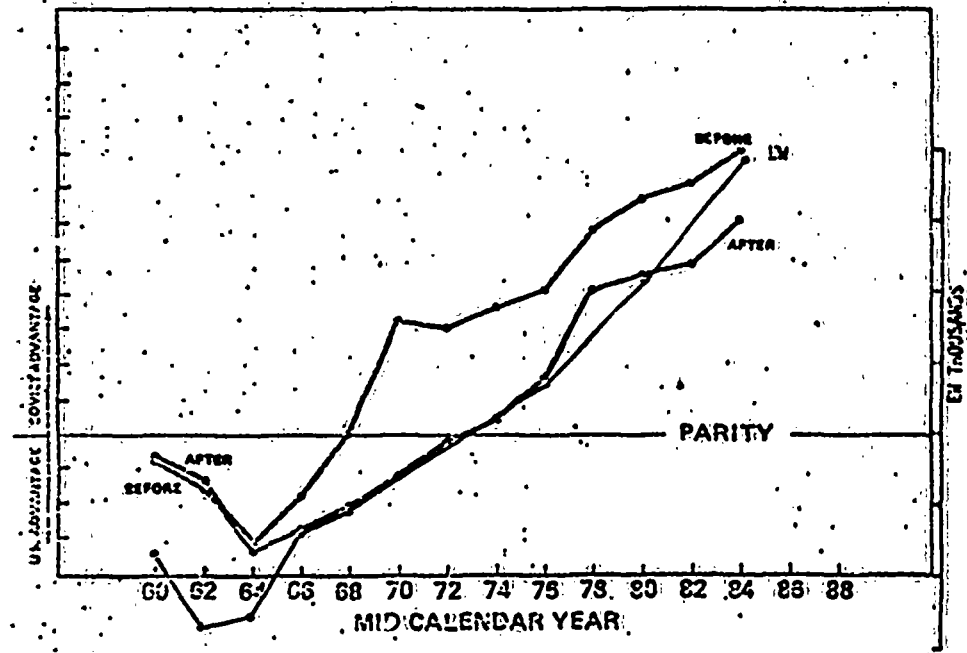
Paul H. Nitze

Paul H. Nitze

Enclosure

Soviet - U.S. Throw-Weight Differentials

SOVIET NET ADVANTAGE IN TOTAL FORCE
THROW-WEIGHT (MILLIONS OF POUNDS)



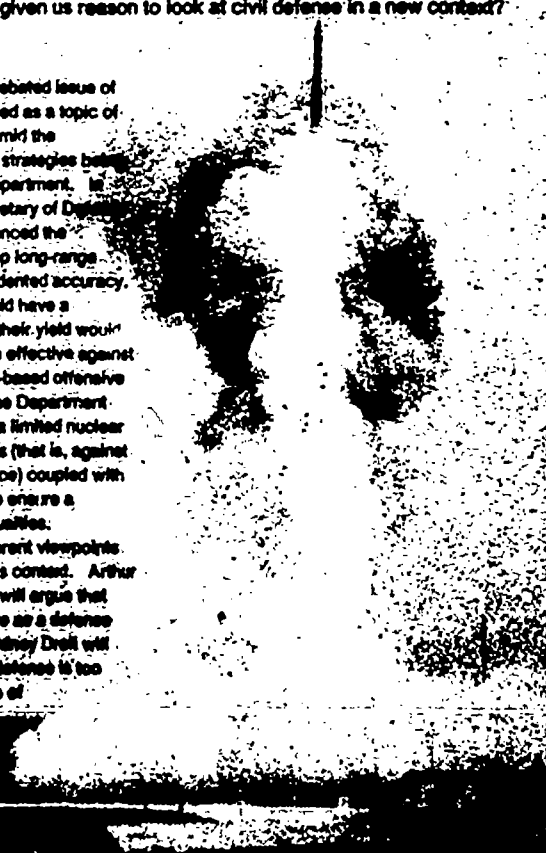
MATERIAL SUBMITTED FOR THE RECORD BY DR. SIDNEY DRELL

Civil defense in limited war—

Have recent developments in strategic weapons given us reason to look at civil defense in a new context?

Civil defense, once a hotly debated issue of the 1960's, has again surfaced as a topic of controversy. It reappears amid the discussions of possible new strategies being proposed by the Defense Department. In January 1974, the then Secretary of Defense James R. Schlesinger announced the intention of the US to develop long-range ballistic missiles of unprecedented accuracy. Because such weapons would have a relatively small error radius their yield would not have to be as large to be effective against military targets such as land-based offensive missiles. Hence the Defense Department has raised the possibility of a limited nuclear war with counterforce strikes (that is, against the opponent's offensive force) coupled with a program of civil defense to ensure a minimal level of civilian casualties.

We present here two different viewpoints regarding civil defense in this context. Arthur Broyles and Eugene Wigner will argue that civil defense can be effective as a defense against a nuclear attack. Sidney Drell will argue that the price of civil defense is too high in relation to the degree of



a debate

In Favor:

Arthur A. Broyles and Eugene P. Wigner

Should the American people be protected from the effects of nuclear war? Let us first narrow that intensely studied question to one that lies within the realm of physics to answer—namely, can such protection be effective? Evaluations of various evacuation and shelter systems show that they can greatly reduce the number of casualties in a nuclear encounter. Our response thus agrees entirely with the statement by V. Chuganov in the *Civil Defense Handbook of the USSR*: "Although the discussed means of destruction are called mass actions, with knowledge and skillful use of modern protective measures, they do not destroy masses of people, but only those who neglect the study, mastery and use of these measures."¹

The question then broadens into one with psychological and political aspects and cannot be answered precisely or completely. Nevertheless we feel that our nation's civil defense preparations may determine the balance of power in some future nuclear crisis. Civil defense is more important than ever at a time when other nations have extensive civil defense plans, and when the balance of terror that has reigned in fear is being upset by the development of new types of weapons.

The protective measures against nuclear explosions and their effectiveness can be evaluated on the basis of a wealth of data gathered by the Atomic Energy Commission in its nuclear testing program. Besides making quantitative measurements of such phenomena as blast-wave pressures, fallout intensity patterns and heat-ray intensities, the AEC constructed buildings and other structures in the vicinity of nuclear explosions and observed the resulting damage.² This information has been used by the AEC (now ERDA) laboratories, RAND Research Institute, RAND Corporation, the Hudson Institute, U.S. National Research Council and other institutions to derive and determine the effectiveness of methods for protecting people. Their results are in surprisingly close agreement.

Unfortunately the general public is not well informed about such studies, probably because a large fraction of the physics community as a whole is not aware of them. And yet so much physics is involved that physicists bear a responsibility to understand it themselves and to pass on the information through the classroom and other contacts. A clear presentation of the facts is essential because it is possible, as we shall see, that a nation's civil defense preparedness may determine the balance of power in some future nuclear crisis.

continued on next page

Opposed:

Sidney D. Drell

The strategic doctrine of "limited nuclear counterforce strikes" has been revived in the United States during the past few years. This return to a policy that was discarded more than a decade ago is accompanied by a renewed interest in evacuation and expanded civil defense programs, which would require massive relocation and evacuation of populations during crisis. Official government statements during the past two years allege that this combination offers the prospect of low levels of fatalities and casualties resulting from the immediate blast, thermal, radiation and subsequent radioactive fallout effects. In particular the former Secretary of Defense, James R. Schlesinger, in the Annual Defense Department Report for FY 1976 stated that "Relocation of the population from high risk areas near key military installations and the protection of the rest of the population against fallout could reduce nationwide fatalities due to fallout from a limited Soviet counterforce attack to relatively low levels well under 1 million—provided that the people in the communities that would be most exposed by fallout from such an attack make effective use of the shelters available."³

The conclusion drawn from these claims and analyses is that limited nuclear war may be palatable and need not escalate to the level of an all-out nuclear exchange, which would cause unimaginable horror. In fact, on 11 September 1974, Secretary Schlesinger testified⁴ to a subcommittee of the US Senate Committee on Foreign Relations that "The likelihood of limited nuclear attacks cannot be challenged on the assumption that massive civilian fatalities and injuries would result."

Because the basis for this change in strategic doctrine is the relatively low fatality level, we must examine not only the total civil defense implications of this doctrine but also the assumptions about the nature and effectiveness of the weapons used in the attack.

Civil defense in the larger context of an all-out nuclear strike against population centers will not concern us here, not only because it is not being proposed at present but also because most who have studied the financial and societal costs, not to mention the technical challenges, of such a program have concluded that it is not practical. But how practical and how effective is civil defense in a limited counterforce contest?

The resurgence of the doctrine of limited nuclear counterforce has been spurred by progress in weapons technology—in particular, the development of accurate and reliable

continued on page 13

The principal sources of danger and the most effective measures against them are listed in the table on this page. (Of course a far more comprehensive display of the data requires something like the elaborate description in the USSR handbook.) Because of the short time available for action to protect against effects of nuclear weapons, survival depends very heavily on previous planning and preparation. The effectiveness of all the protective measures would be much increased if the population were familiar with them well before the attack. The stockpiling of relatively simple tools can also help in the long term recovery effort. Because the subject is complicated and requires extensive consideration, we shall limit our discussion to the problems of survival of the initial effects of the attack that are listed in the table.

The most obvious way of protecting against all these effects is to prevent the bombs from exploding. For example, the US might attack the enemy launch site before the missile leaves it. Such

an attack in the purpose of the "smarter bombs" mentioned by Bernard T. Feld in the July 1975 issue of *PHYSICS TODAY*. Or, the US might destroy the increasing number of its own missiles—the Anti Ballistic Missiles. Despite extensive debate over the ABM, it cannot be generally implemented now. As a result of the SALT I treaty, the ABM is restricted, so far as nonmilitary defense is concerned, to Mexico (with a population of 45 million) and Washington, D.C. (population of 1.5 million). Nevertheless, even a small ABM system could be very effective. By destroying the first wave of incoming missiles, it can give time to the people to enter shelters or to protect themselves in other, although less effective, ways.

Once a bomb does strike, the first of fear is the electromagnetic pulse. This pulse threatens electric power transmission rather than human lives, although the disruption of radio transmission is of concern during an emergency.

The protection against the other effects of nuclear explosions can be pro-

vided in two ways—evacuation and shelter. Evacuation takes very much longer than the missile flight time and hence can not be considered to be a truly defensive measure. If evacuation is undertaken during a crisis, it will greatly aggravate the situation. It can be effected before providing a shelter and serve as an aggressive move. Hence, since the advent of missiles, our country did not seriously prepare to build the elaborate evacuation preparations of the USSR became known. Now it is being seriously planned as a "counter-evacuation," that is, as a response to a possible evacuation of the cities of the USSR. The Danes study, which was organized by the National Security Council, considered a nuclear attack in which the USSR aimed two thirds of its destructive force at civilian targets. This attack would destroy 4% of the US population under present circumstances. The preparation for the "counter-evacuation" would cost about \$200 million—one day's welfare expenditure—and would reduce the popula-

H-Bomb major immediate effects			
ELECTROMAGNETIC PULSE	Expanding charged particles from bomb explosion	Damage to electronic equipment up to hundreds of miles; power stations at shorter ranges	Special protective equipment related to lightning security devices; no effects on humans
PROMPT NUCLEAR RADIATION	Nuclear reactions during bomb explosion	Normally less than blast	(Normally negligible compared to blast)
HEAT RADIATION	Radiation from the hot fireball generated by the explosion	Fires ignited a few tens of miles but greatly reduced by clouds or smog and dampness	Eliminating exposed inflammable material; shelters including large public buildings
BLAST WAVE	Expansion of hot bomb material pushes air into a wave of wind and high pressure	Destruction of buildings as well as serious injuries to people from flying objects and falling buildings from five to ten miles	Evacuation; blast shelters; reinforced public buildings
FALLOUT	Radioactive products of nuclear fission mixed with vaporized earth	Heavily wind dependent, can be the order of one hundred miles	Sheltering by large public buildings or special shelters for a few days or weeks until the radiation level has died down



Shelter under a storage vault for registering fallout for its entrance hole (right). The authors argue that such shelters can



be effective in reducing US casualties in the event of a nuclear attack to about 2.5% of the total population. (Figure 1)

tion has 7.5 MN. Because the USSR population is so low crowded into cities than ours, their losses would be smaller relative than ours, according to our calculations. This has in fact not happened by the Soviets in World War II.

Shelter design

The defense measures advocated in the U.S. and initiated by the Chinese, in the presence of shelters. The technical program is to design a shelter with maximum blast resistance, minimum access time and minimum cost. The Chinese appear to have acquired the previous design (Figure 1) US scientists, during a 1970 study at the Oak Ridge Civil Defense Project, estimated that effective shelters could be built at a cost of \$25 billion. In similar conclusions, four years later the Foran study found that a \$3-billion investment, very much larger than that needed for preparation for countercorruption and even ten of new years, several cities would reduce the casualties caused by an attack by the USSR to 2.5% for the entire US population. "If a 1970 study concludes in 1974 that there is no defense against a 10 megaton bomb, now is the time to act," says Foran. "If not, we have lost sleep over the effectiveness of shelters when it is too late to improve them." If shelters were a effective, the expenditure of China, the government of a nation must, over time, would be entirely unprofitable.

A third intermediate arrangement for

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defense, also indicated already in the Soviet handbooks on civil defense, is to move most city dwellers away from densely populated areas but not as far as the pure countercorruption program. Instead, the Soviets could build "expedient shelters" using materials at hand. Rather expensive designs, which can be built in contained perspective over points, give a blast resistance of 30 pounds per square inch. A sample plan is shown in Figure 2. Such a system, not significantly more expensive than the simple evacuation plan (not much over \$20 million, according to the Foran study) could reduce the fatalities as well as does the elaborate and rather expensive shelter system referred to above. However, neither one can provide protection against a sudden attack.

In the design of shelters, prompt nuclear radiation can generally be ignored in comparison with the blast wave unless the blast protection is very good or the weapon is very small. The reason is that prompt-radiation effects decrease much more rapidly with distance than do blast effects. To see this, note that the blast pressure in pounds per square inch from a 10 kiloton explosion at a distance r in kilometers is given approximately by

$$P = \frac{1.6 W}{r^3}$$

The intensity of the prompt radiation decreases more rapidly than $1/r^2$ because of the absorption by air. Thus according to the equation blast shelters designed for 100 psi will be effective against a 1 megaton weapon for distances greater than about 1.5 km. The area within which the pressure exceeds a given amount is in direct proportion to the distance. Thus the area where the pressure exceeds 1 psi (the pressure often considered as the survival pressure for unprotected people)

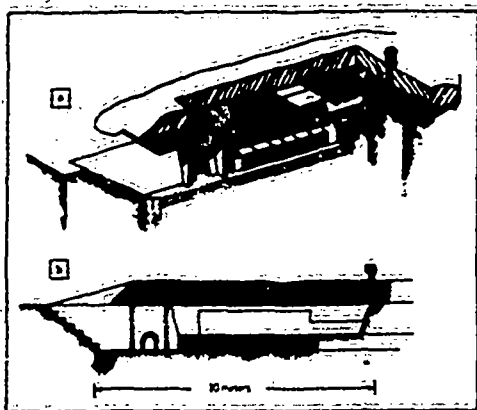
is twenty times the area for 100 psi.

The effects of blast decrease more rapidly with bomb yield than do those from prompt nuclear radiation. For very small nuclear weapons, prompt radiation can be more harmful than the blast. Thus for a 1-kiloton bomb, neutron and gamma radiation at 50 meters are 500 and 100% of the protection provided. The blast pressure at that distance is 5 psi, quite tolerable. Indeed the most lethal blast pressure for a well-instructed person, who knows how to protect himself from flying objects, is well in excess of 200 psi.

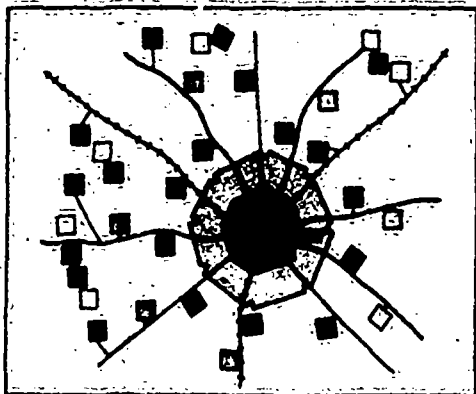
Blast shelters are designed not only to diminish the air pressure in which a person is subject, but also to protect him from flying objects. A properly designed blast shelter will also place sufficient mass between a person and the outside fallout particles to shield him adequately from the radiation. One foot of earth cover reduces radiation perpendicular to it by a factor around ten, and more than that for slanting rays. Shelters also provide cover against heat radiation and external fires. Two feet of earth all provide adequate protection from actively burning fire.

Global consequences

Worldwide effects from the detonation of a nuclear explosion naturally demand as much concern as the immediate effects. Many wonder whether the global consequences such as fallout might not be so severe as to deter any nation from even precipitating an attack. The most recent investigation of this question, the New report by the National Academy of Sciences, verified previous conclusions that world-wide fallout produced in a nuclear attack would not be sufficient to deter the attack. It found, however, that the de-



Heavy shelter plan of the Soviets is a subject in dispute with a ceiling of pure prices. The plan shows the general view (a) and cross section (b). From reference 2. Figure 2



Soviet evacuation scheme illustrates their disaster planning. Each point is subject to light colored region surrounding perimeter of city (dark area). Map shows direction for relocation of workers of plants (to do not into the industrial plant (cross squares)) and to those that temporarily support square (light color). Also shown are relocation sites for evacuees (light gray) and for plants and regional areas (from squares). Black squares are existing communities. Colored lines denote evacuation routes. Figure 3

pletion of the seven layer could be more serious. Increased radiation might force people to adopt special protection against sunlight, and it would lead to an increase in the skin cancer rate by a factor of almost ten. The depletion of ozone would also affect some ecological

systems in important ways. Although the study calls for additional research to answer more remaining questions regarding world-wide effects, Philip Hander, President of the National Academy, makes the following statement in his letter accompanying the NRC report

"At the same time, the governments of the United States and of other major nuclear powers should be alert to the possibility that a geographically distant, populous other nation might determine that the desire of short-term damage to itself in this report, would be 'acceptable' and that, since long-term recovery would be highly likely, might conclude that its own self-interest is compatible with a major nuclear exchange between other powers."

In other words, we cannot count on global effects in themselves as deterrents.

Even though civil defense measures can be effective as population protection, the US lags behind many nations of the world in building such systems. The Chinese have installed extensive blast shelter systems; the Russians have performed an evacuation procedure that removes the city population to sitting areas where heavy shelters are to be constructed from materials at hand. A sample evacuation plan from the USSR handbook is shown in figure 3. Actually, this system would have effectiveness if another nation initiated the war. It takes two or three days to evacuate cities and to build emergency shelters. However, if such time is available, the USSR system is cheaper and probably more effective than the Chinese blast shelters. The Chinese, however, can occupy their shelters in a very short time and thus be prepared for an attack with very little warning. Evidently the Chinese are afraid that someone will attack them with little notice, while the Russians believe that they are in a position to determine when the nuclear exchange will come and that they can carry out their evacuation and construction in time.

Political aspects

The United States, on the other hand, has essentially no civil-defense system. This lack is deliberate, and the reasoning behind it is clearly evident in the following: "Deterrence on military matters." Our leaders recognize that, if the nuclear powers have the capability of stopping the opposing nuclear attack first, the U.S. is tempted to strike first. If they wait, their own weapons may be destroyed first and there would be no deterrence. Thus the U.S. until quite recently, carefully designed its nuclear strike force to be effective against the population of an opponent, not ineffective against its weapons. We also did not protect our people. This inaction assured him that we would not attack first and therefore, that he need not strike a preventive blow.

The trouble with our strategy was that the Soviets, and more recently the Chinese, have not accepted this "balancing of terror." The Soviets' large mis-

also are effective against our land-based missiles and their killer submarines can attack our Polaris submarines. In addition, our population is so exposed that it is doubtful we would escape the casualties required to participate in any stage of nuclear war through a second, third, or any strike with our missiles. Perhaps such considerations led Secretary of Defense James R. Schlesinger to propose the addition to our arsenal of missiles that would be of little against sheltered enemy

ICBM's.⁸ However we are sure, past and present, that Washington has not given strong support for measures that will protect the US population from the effects of a nuclear war.

As a final remark we wish to add that it disturbs us greatly that, presumably appropriate of the protection of our own citizens against nuclear attack do not appear, and do not even mention, the elaborate preparations of the USSR in this direction. The Soviet handbook on civil defense is circulated in millions of

copies. It has been carefully studied at the Oak Ridge National Laboratory. The USSR gives instructions on civil defense in the high schools, they carry out exercises in their factories and, most disturbingly, they have made elaborate preparations to evacuate their cities preceding a confrontation. If the opponents of the civil defense feel that these preparations are not even worth mentioning, why do they consider the protection of our own civilians objectionable and even premature?

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MIRV's (multiple independently targetable reentry vehicles), which enable a single missile to attack several different targets with high accuracy. These MIRV's can selectively attack hardened military targets such as underground cities containing the fixed land-based ICBM forces and at the same time can cause relatively low casualty levels. In short this combination of factors forms the basis for the military value and strategic credibility that are claimed for such an attack.

Of course the effect of weapons against both military targets and civilians depends critically on such factors as the numbers and kinds of incoming weapons, their height of burst, and the level and extent of civil defense protection. One example described by Secretary Schlesinger in his Senate testimony concerned an attack against all the fixed ICBM—1000 Minutemen and 54 Titan missiles—with a single one megaton warhead incident on each site and with the warhead fuzed to detonate in air at the optimum height of burst. The attack would result, he claimed, in fewer than 80,000 dead and 800,000 injured of all from radioactive fallout.

The fatality levels for such an attack are calculated by making certain assumptions about the civil-defense protection provided in terms of the protection factors of various shelters. These numbers are the consequence of the line of thought that penetrates the shelter. Thus the existing civil-defense program requires that, for a shelter space to be identified as such, it must have a protection factor of 20-100. That is, it must shield against all but 1-2% of the radioactive fallout. This factor is equivalent to a dirt cover of approximately two feet or a concrete wall of about 16 inches. Its

comparisons, a single story residence has a protection factor of three, and a residential basement, a factor of 25.

In the attack described by the Secretary, the Department of Defense assumed that for 30 days roughly 25% of the US population remained in designated shelters with protection factors of 50-100, that 20% sought residential basement protection and that the remaining 45% were protected by the average residential protection factor of 4. These calculations were stopped after this thirty-day period and then do not include the final 6% of the fallout not reaching target effects.

However, the Secretary did not discuss the military effects of the attack, which was designed to cause such low civilian casualty levels. Straightforward calculations show that the nuclear attack assumed in the above calculations would destroy well under one half of our fixed ICBM force if carried out by missiles with the targeting accuracies projected for the Soviet ICBM force. This conclusion follows even if we assume that the Soviet missile systems have a perfect 100% reliability, which is surely a gross overestimate, particularly when you recall that we are talking of a massive attack coordinated in time so that all 1054 US II BOMs are hit essentially simultaneously. I can see no practical military value in such an attack. On the contrary it would surely invite lethal retaliation.

In response to these and other DOD calculations on collateral civilian damage related to counterforce attacks, the Senate Foreign Relations Committee in September 1974 asked Congress's Office of Technology Assessment to review the DOD analysis. A panel convened by OTA for this purpose raised questions about the sensitivity of the DOD analysis to various assumptions, including a range of wind, weather, conditions, civilian protection factors and parameters of the incoming attack.⁹ The DOD responded with more calculations, which showed that the expected fatalities are indeed very sensitive to the nature of

the attack and can vary by large factors. In particular, the DOD now finds that fatalities in the range of 10 to 20 million will result from prompt effects and fall out alone if the attack is delivered by the nuclear weapons of today or of the near future and designed to destroy the majority of the attacked ICBM force.¹⁰ Figure 1, which is based on DOD calculations, illustrates the fatalities as a function of the percentage of ICBM sites destroyed. (Note that the DOD reduced the civil-defense protection factors assumed for the last two attacks by 25% relative to that described earlier, otherwise, with adequate protection factors, we would expect the estimated ground burial tolls to be in the millions rather than two 500,000 burials, one in air and one on the ground.) Even at the highest level in figure 1 a healthy retaliatory force of some 210 ICBMs would remain as well as all the SACs, bombers and missile submarines.

Naturally the predictions of figure 1 are subject to such uncertainties as the weather and winds at the time of attack, and are sensitive to the degree of civil-defense protection and to the ability to provide medical care to the injured. Nevertheless, one can clearly not contemplate an effective strategic attack designed to decimate our ICBM force in terms of casualty levels of one million civilians, but rather must consider it in terms of upwards of tens of millions, even assuming extensive protection of the population.

The price of civil defense

The most recent DOD reports also make clear that civil defense would be a central element of our policy of flexible response, with emphasis on limited nuclear counterforce. Indeed the justification for the civil-defense budget was expressed in the report for FY 1976 largely in terms of its role as a necessary adjunct of our policy emphasis on flexible response. The DOD report also argues that we must have the same population evacuation options as the Soviet Union for two reasons.

⁸ Secretary of Defense is deputy director of the Strategic Studies and Research Center. The text is adapted from his testimony presented on 14 September 1974 to the Subcommittee on Arms Control, International Law and Organization of the US Senate Foreign Relations Committee.

to be able to respond in kind if the Soviet Union attempts to initiate us in time of crisis by evacuating population from its cities" and
 "to reduce fatalities if an attack on our cities appears imminent."

This position marks a major shift in emphasis of the civil-defense program since the 1974 Annual DOD Report, when it was largely justified by Secretary of Defense Elliot Richardson to help recover from peacetime disasters. I personally endorse this previous objective and furthermore I support the existing program of identifying and stocking shelters as a prudent insurance program against a wide range of incidents, including the accidental launch of nuclear weapons, a severe nuclear reactor accident or natural disasters such as hurricanes. However, a comprehensive civil-defense program involving both sheltering and evacuating the population on a very large scale is a different thing. Undoubtedly it can be demonstrated to have a great lifesaving potential in the event of a nuclear attack against specific military targets. But the issue is in essence an issue of the price one has to pay for a civil-defense program in relation to the degree of protection one buys against specified attacks. What price in our practices, values and style is a society? What price in-fallout cover is a society?

Investment in a civil-defense program could, as one function, protect the population from the blast, thermal and radiation effects in the immediate vicinity of a nuclear explosion, roughly within a radius of four miles for a blast of one megaton. Such protection against the close-in effects is either impossible or tremendously costly.

Another function of civil defense is to reduce casualties from fallout generated at distances well beyond several miles. The effect of dangerous fallout levels, extending many hundreds of miles downwind from nuclear explosions plus the long range effects of radioactive contamination in extensive areas, differentiates nuclear war from all other previous experience. The range and extent of the threat to life of radioactive fallout depends critically on many factors including the height of burst (that is, whether or not the fireball from an explosion near Earth's surface sweeps up and spreads an enormous cloud of radioactive debris), the fraction of fission yield in the bomb design and the weather.

The biological effect of fallout is measured in terms of the standard dosage unit of the twenty-five (25) millirem (mrem). Whole body exposures to less than 100 mrem cause blood changes but no disabling illness. Experience following the Hiroshima and Nagasaki blasts shows that doses of 100 to 200 mrem cause a certain amount of ill-

ness including fatigue and perhaps some nausea, but are rarely fatal. However, levels of about 450 mrem of whole-body exposure can cause severe illness and produce a 50% fatality rate. A scale in the basis for assessing how much protection must be provided for an effective civil defense. As is shown in Figure 2, an unsheltered person as far away as several thousand miles downwind from an attacked missile field or military base would be exposed to an expected 600 mrem.

The time scale of the radioactive fallout is also of great importance in considering protection. For how long a period of time after an explosion must one be sheltered from fallout in order to survive? For typical burst altitudes in the atmosphere a human body totally and completely shielded from fallout during the first hour immediately following a nuclear explosion will still receive 45%, or almost half, of the total fallout if exposed thereafter. Twenty percent of the total dose is deposited after the first day, and a person emerging after four weeks of complete protection from fallout will still be subject to 6% of the total dosage. The decrease in rate of fallout follows a $1/T^{1.2}$ law, and evidently the required time scale for protection is measured in weeks.

This discussion of fallout effects shows the required physical parameters of civil-defense shelters. Even dispute the technical facts concerning the means to protect large populations for one to four weeks after an attack from the physical effects of blast, fire, radiation and fallout. However, many social parameters and costs are also involved because identified shelter spaces and

evacuation plans do not by themselves make an effective civil defense program, in my judgment. A total system must be organized and incorporated extensively into civilian life through training programs, rehearsals, and volunteer activities. The pre-attack shelter organization envisioned by the 1963 Office of Civil Defense Guide planned that a shelter accommodating 100 civilians would require an operating cadre of 25, of which 10-12 would need prior training. This number constituted 10% of the sheltered or 20% of the adult population.

To recruit the required large cadre of trained personnel the government would have to look beyond existing community safety personnel such as policemen and firemen. Perhaps the military reservists and National Guard units could play a central role in organization and training, but they would still have to rely on a large functioning organization involving a much larger number of trained civilians.

One task of trained personnel would be to operate communications systems over large distances in order to deal with shortages of food, water and medical supplies. They would also have to know how to use radiation detectors, because in the immediate post attack period the fallout levels can vary greatly from one locale to another. Like the snow, radioactive debris accumulation where driven, depending on wind and weather conditions as well as on the location and shadows of tall buildings. Local pockets of relative safety may exist and areas with lethal levels of radioactivity. Finally the trained cadre would have to provide leadership in the



Generally tall curves with the type of nuclear attack, among other parameters. All the calculations were done by the DOD in its studies. Secretary of Columbia Damage Calculators to United Nations Secretariat, sent to the Science Foreign Relations Committee on 11 July 1975 except for the two with asterisks, which are by the author.

Figure 1

long period of extreme social disorder after the attack and would have to establish adequate services for a society with a large proportion of ill and injured citizens.

Beyond the training of these special leaders, the plans for massive population relocation and evacuation out of high risk areas near the possible counterforce target system require a heightened level of public awareness and concern, and a willingness to rehearse the evacuation plans. Without them, surely a chaos spawned by panic will ensue at the time of implementation. How can one draw public attention, much less commitment, to such plans without "overstating" them by a sustained escalation of apprehensions from the mood of today to the dangers of nuclear exchange between the US and the Soviet Union? Is not such an escalation of apprehensions more to be feared than desired in the US and Soviet Union move further from the brink of a nuclear conflict due to misunderstanding, misapprehension or mistake and move mutually at SALT for a more stable nuclear balance at lower levels of nuclear armaments? Indeed one of the lessons of the civil defense shelter exercises in 1961 and 1962 was that the large expenditures for civil defense and the general education accompanying a major shelter program could only be sold to the American public by presenting the very real threat of nuclear war.

Strategy

Consideration of civil defense as an element of strategy has been given renewed importance by the new emphasis on fighting a limited nuclear war. This policy changes our nuclear doctrine of the past decade, which has been dominated by the recognition that once a nuclear weapon is detonated on US or Soviet territory there would be substantial probability that nuclear exchange could not be terminated before both nations were destroyed and the casualties numbered hundreds of millions. The new strategic doctrine raises the issue of whether this unpleasant "balance of terror" and mutual hostage relationship might be changed by the adoption of new tactics and the development and purchase of new weapons for fighting limited nuclear war at acceptably low casualty levels. Is before such a policy would cause the following deleterious effects:

1. Harm to strategic stability. The development of a new missile force designed specifically as hard site killers would fuel concern on both sides about the vulnerability of the first ICBM's to a preemptive first strike. It would emphasize the importance of striking first and could thereby destabilize a tense situation. Furthermore the development and rehearsal of civil defense



Fallout pattern for an atomic on US ICBM plus fallout oval. Two hour contours show reduction of 400 and 200 rads for a person with a protection factor of 3. In the lightest shaded region, reduction of 20 rads is indicated. Data are for a winter day and will vary with wind patterns. (From R. L. Garber, reference 6.)

Figure 2

plans involving evacuation and relocation of large populations could be viewed with alarm by its opponent as preparation for executing a first strike.

2. Harm to SALT talks. The development and testing of the required new missiles will create pressure against quantitative reductions in the numbers of strategic forces and against such verifiable qualitative restraints as missile test-flight quotas and limits on the rate of deployment of new systems that would slow down the pace of progress in the arms race.

3. Waste of resources. The plans justified by this year's rhetoric may materialize into the multibillion-dollar weapons systems of the next decade unless the rationale behind them is rejected.

4. Shift of values. Implementation of an extensive civil defense system through massive training will affect the priorities of our society and will require heightened concern about nuclear war.

which would counter the progress that has been made toward reduced international tensions.

Finally, what will prevent the eventual escalation of an initially limited nuclear war to an all-out nuclear holocaust? Once nuclear weapons are used in war at all it will be very difficult, if not impossible, to verify yields, sizes, numbers and types of the nuclear explosions on both sides. However, the one technically unambiguous fact is whether or not nuclear weapons have been used at all. Therefore it is wisest for the US to adopt as a national policy the highest possible nuclear threshold. We should maintain a gap between nuclear and non-nuclear warfare that is as clear and wide as possible, and resist the temptation to develop doctrine and civil defense programs that undermine, on dubious technical and strategic premises, the collateral damage and the casualty levels of nuclear conflict.

Broyles and Wigner reply to Drell

Our own discussion is principally concerned with the technical question of whether defense against nuclear weapons is possible. We feel that as physicists we should be able to judge the extent to which such defense is possible and we also feel that the physics community at large should have a degree of familiarity with this problem. Sidney Drell's article is less concerned with the physical problem than with the more important but less precisely ascertainable one concerning the political implications and consequences of a vigorous civil-defense effort—a subject to which only the last section of our own article

refers. Nevertheless, we would like to comment, first, on a problem of physics concerning which our opinions differ.

We differ with Drell in our estimation of the radiation danger from fallout after a reasonably long exposure in shelter, let us say two weeks. First of all we calculate that the total radiation dose from the fallout after two weeks amounts to less than 7% of the total radiation of the fission products from 1 minute to infinity. In addition, the radiation becomes softer as time goes on, so that it becomes easier to protect against it. More importantly, the radiation after two weeks is stretched out

terize the scale of the disaster resulting from a major nuclear conflict and by how little can be predicted with confidence.

I believe there is no basis in fact for the statement by Hroyne and Wagner that "the Soviets' large missiles are effective against our land-based missiles and their killer submarines can attack our Polaris submarines." This allegation is also at variance with statements given by our civilian and military leaders. To quote Secretary Schlesinger, for example, in the Annual Defense Deep Incent Report for FY 1976: "Our sea-launched ballistic missile force provides us, for the foreseeable future, with a high confidence capability to withhold weapons in reserve."

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STRATEGIC FORCE STRUCTURE AND STRATEGIC ARMS LIMITATION¹

(By Harold Brown)

I am pleased to be able to address the Institute of U.S. Studies of the Soviet Academy of Sciences today, and am very grateful for Dr. Arbatov's kind invitation to visit with you. The subject on which I speak today is one that has occupied a good deal of my professional career. For nine years I was a member of the staff of the Lawrence Livermore Laboratory, and for the last of those years I was its director. That laboratory's activities cover a wide range of nuclear applications, but its original purpose and most important function is to design and test nuclear weapons. For eight years after that (1961-69) I was a government official in our Department of Defense. The first four were as Director of Defense Research and Engineering, responsible for all research and development, test and evaluation activities in the Defense Department, and for making recommendations on production and deployment decisions from a technical point of view. From 1965 until 1969 I was Secretary of the Air Force.

My acquaintance with arms limitation negotiations dates back to the late 1950's, when I was a member of the U.S. Delegation to the Conference of Experts on Detection and Identification of Nuclear Tests, and subsequently Chief Scientific Advisor to the Conference on Discontinuance of Nuclear Tests that began in Geneva in the fall of 1958. Since 1969 I have been a member of the U.S. Delegation to the Strategic Arms Limitation Talks. Though my principal professional responsibilities, as President of the California Institute of Technology, have nothing to do with military matters, I continue to have a keen personal interest in and sometimes do act as a consultant to the Government on military-technical affairs.

Let me begin my discussion of the subject of strategic force planning and strategic arms limitation by stating a thesis. There are various possible purposes for strategic nuclear forces. Some of them are overlapping, or at least not wholly mutually exclusive. Most of them are in my opinion illusory. The principal possible purposes I see are: deterrence (in various forms); coercion; war-winning and its relative, nuclear war-fighting. I exclude for the purposes of this talk the motive of prestige—a seat at the great power table; it does not apply to the U.S. and U.S.S.R. My own view is that unless the U.S. and the Soviet Union can agree—at least tacitly—that of these only deterrence is feasible for either of them with respect to the other, and that they will structure their forces so as not to undermine that objective in pursuit of other objectives, further progress in strategic arms limitation will be severely hampered, and perhaps not possible.

Let me describe the alternative objectives of nuclear strategy as I see them in somewhat greater detail. I am sure that much of this is elementary to most of you. Undoubtedly many of you have progressed beyond this rather unsophisticated thinking and I would be happy to hear where your own thoughts have led you.

¹ Dr. Brown is a former Secretary of the Air Force and Director, Defense Research and Engineering. A member of the SALT delegation, he is now president of California Institute of Technology. The text submitted is a talk given by Dr. Brown before the Institute of U.S. Studies of the Soviet Academy of Sciences in Moscow, March 1975.

Deterrence is, first of all, the perceived capability and intention of retaliating so as to destroy a substantial part of the population and industrial capacity of any nation initiating a nuclear attack on oneself. By this capability and intention, deterrence has the objective of preventing any such attack from being launched. One cannot be precise in advance as to how much destruction and what assurance of destruction is needed to deter. To some degree it depends on how unattractive the political decisionmaker considers the alternatives to nuclear war. Indeed deterrence is not without its risks as a doctrine, because there may be some who are not rational enough to be deterred by the prospect of "assured destruction." That danger will grow as more countries obtain nuclear weapons. In addition, deterrence may fail if one or another of the nuclear powers decides irrationally that somehow circumstances are so bad that it would be better off with a nuclear war. Alternatively, one power might be convinced that it was about to be the victim of a nuclear attack no matter what it did, and that the outcome would be "better" for it should it strike first itself.

By extension, the concept of deterrence can be used to apply to deterrence of large-scale non-nuclear attacks on oneself or one's allies. To some degree this application can indeed operate, through the prospect of a single large escalation or a number of small ones leading to all-out thermonuclear war. But it operates much less well than deterrence of all-out attack, because it deters the other side by the thought that a disastrous response may occur, not that it certainly will occur.

A second possible strategy is that of coercion. This is based on a two-sided situation in which both sides perceive enough difference in their respective strategic nuclear capabilities to produce for one of them a net military advantage which can be translated into political advantage. A "balanced deterrence" strategy asserts that within very broad limits the major strategic forces of the United States and U.S.S.R. cancel each other out in political terms. The coercion strategy assumes that they need not. It asserts that the difference—multiplied by some coefficient—gives the more powerful nation a political advantage. In this view, the advantage could come into play either in case of a crisis involving a nuclear confrontation, or in a conventional war by virtue of the perceptions of the outcome should it be escalated into a nuclear war, or in peacetime in terms of the opinions of third countries and the corresponding political effects on them. In my view, this strategy is a dangerous one to both sides if it is held by either. Its workability depends on a weakness of will more than a weakness of weapons systems. It carries a high risk because willingness to make strategic use of nuclear arms, even in the most limited way, is a necessary part of such a strategy.

Yet the likely outcomes of even a very small thermonuclear exchange, carried to its more probable conclusions, are much worse for both sides than other available alternatives. Thus the differences among outcomes in such a war between two major nuclear powers, whether traceable to their geography, to their differences of armament, or to the way in which the war starts, are very small compared to the devastating effects on both countries. As W. K. H. Panofsky and others have pointed out, the mutual hostage condition of our two countries is a fact. It follows from the existence of the large numbers of nuclear strategic weapons systems deployed and the ineffectiveness (which need be only quite

modest for this conclusion to apply) of defense. This is not a doctrine or a policy, but a set of facts. If the facts are as clear as I believe them to be, it does not take long for them to become obvious to everyone and thus remove any coercive military or political advantage from even substantial differences in strategic military capability.

The third alternative strategy, war-winning, is a conceivable one from a purely military point of view. From that point of view it might be said that whoever had substantial strategic force advantage after a thermonuclear exchange directed principally at military targets has a greater war-winning capability. In its extreme form, it might be said that if one side has strategic forces remaining when those of the other side have been essentially used up, the first side has won. This view seems to me to be quite a bit too narrow—in fact such use of a purely military measurement of winning loses all sight of the purpose of military forces and their use. It assumes in the first place that one can assure that the nuclear attacks on both sides are confined to military targets—or that only military targets matter. To the extent that deterrent capability exists—and as I have suggested, that is a very large extent indeed—the side that is “losing” a countermilitary exchange can call a halt by invoking deterrence—the threat of counter industry/population strikes. This is a deficiency in the concept of “war fighting.” In the confusion of nuclear war, the distinction between classes of targets is very unlikely to be preserved anyway. Even if it were, the secondary effects of strikes on “military” targets are likely to be enormous because military targets include military and communication headquarters, which are almost invariably co-located with population and industrial centers. Thus even a thermonuclear exchange that succeeded throughout its course in being directed at military targets would leave tens of millions of dead on each side and the bulk of productive capacity destroyed through direct effects, not to mention the disruptive secondary effects of such destruction. In the most likely case of such an exchange turning at some point into direct attacks on population, the casualties on each side would likely approach the hundred million level. To call the participant in such an exchange who emerges with some strategic nuclear weapons unused at the end of it the winner strikes me as a strange assessment.

If I may digress for a moment, I would like to note that adoption of a deterrent strategy leaves a gap in military planning. To cover the situation in which a nuclear war somehow begins, the military will require in advance a set of plans to “fight” the war—whether to respond to an attack by a single missile with another single missile or to an attack on silos with a retaliatory strike on bomber bases. To some extent the political authorities will want to support the force options needed for such plans, however unlikely they consider the scenarios. This leads in the direction of more accurate delivery systems, low yields (to minimize casualties, and thus avoid escalating the war), better command and control (a good idea in any event), etc.

A nation confronted with the fact of a strategic nuclear attack will indeed want to have assured itself of options other than an immediate all-out retaliatory attack on urban-industrial targets. But every examination I have seen of the various possible subsequent courses of events indicates that it is unlikely that the other options will in the end avoid mutual destruction of the attacker and attacked. Thus

I judge (or at least hope) that the most probable outcome is successful deterrence of strategic war. The next most probable is mutual destruction, and I am convinced that by far the least probable outcome is a nuclear exchange confined in any effective ways to military targets.

I do not exclude the possible use of tactical nuclear weapons as a response to a large conventional attack in some geographical areas. However, in my view the chance of containing their use either geographically or in terms of weapons yields and aim points is quite small.

Providing that no one is deceived into thinking that the existence of forces, options and plans for a strategic countermilitary exchange makes survival of either the United States or the U.S.S.R. in a nuclear war at all likely, or into forgetting that the fatal and almost certain outcome is the explosion on the cities of both countries of nuclear weapons, the existence of such plans and the development of such forces is an acceptable idea. However, to the extent that it erodes deterrence, this contingency planning could increase the likelihood of catastrophe. For that reason, it ought to be severely limited. My own view is that the facts of the indefensibility of each of our countries against nuclear attack by other, and the open-ended nature and unlimited costs of a countermilitary strategy, are clear. I therefore conclude that counterforce capabilities, especially because the limitations on their effectiveness are not matched by limitations on their cost, will not be carried very far on either side. Facts do in the end prevail, whatever doctrine may assert.

The Strategic Arms Limitation Talks and the corresponding exchanges at the highest level since 1967 have repeatedly drawn attention to the purpose of strategic nuclear forces. In the United States the political leadership has faced and accepted these facts. I believe a careful reading of the statements made over the past 10 years by Presidents and Secretaries of Defense supports this conclusion. Military force and operations planning in the United States is subject to scrutiny and approval by civilian authorities at the highest levels. In the U.S.S.R. military planning, at least as expressed in public documents, has apparently not been subject to a similar degree of civilian political review and control. I have also been struck in the SALT discussions by the separation of military doctrine and planning from civilian organizations in the U.S.S.R. For these reasons I am less clear as to whether a similar acceptance of these views about deterrence and war-fighting exists at the controlling political levels in the Soviet Union.

II

It seems to me that unless the United States and the Soviet Union can agree to select balanced deterrence as their strategy, further progress in strategic arms limitation is unlikely. My reasons for this belief will, I think, become clear as I elaborate the way I see the history of our negotiations and their likely evolution.

At present, I believe that there are individuals and groups in the United States who favor each of the three principal alternative strategies that I have listed. My own readings in the Soviet literature on this subject suggest that a similar range of views exists there as well. The ABM treaty of 1972, limiting anti-ballistic missile deployment (it also puts some limits on development and testing as well) was, it seems

to me, based on coinciding views at the highest level in the United States and the U.S.S.R. on deterrence as the objective of the major strategic forces of both nations. To some degree that coincidence of views appears to have become blurred; not as regards the ABM agreement itself—though there is some risk that it may not be able to survive by itself—but in the case of strategic offensive forces.

Our ability to reach agreement on ABM may have resulted in part from a number of particular circumstances. United States and Soviet achievements and plans for antiballistic missiles could be said to have been in about equivalent overall states in the early 1970's. The United States was perhaps ahead in technology, and the Soviet Union in terms of deployment. Both sides had substantial doubts as to whether antiballistic missiles could serve the purpose, not of shooting down individual ballistic missile warheads, but of defending populations. Yet, in each country, without agreement various internal forces could have resulted in extensive, though not effective, ABM deployment.

Both sides were confronted with the likelihood of having to make very large investments as a next step in ABM plans. Each concluded that it could be more valuable to its national security to have the other side forego substantial deployment of antiballistic missiles than it would be to deploy an ABM system of its own. The ABM Treaty was thus an intrinsic and to some degree explicit statement by both governments that they accepted deterrence as the purpose of strategic forces. It includes the explicit statement, "Each party undertakes not to deploy ABM systems for the defense of the territory of its country..."

III

The ABM situation illustrates that timing is an important factor in whether an agreement is reached or not. Each side sees the next generation of the other's weapons as being destabilizing, and would therefore like to complete its own ongoing programs but have the other side's suspended or banned. For example, many people in the United States, including myself, are considerably disturbed by the complex of new Soviet missile development, testing, and deployment programs, particularly the MIRVed SS-17, SS-18, and SS-19 as we designate them. Such individuals in the United States believe that strategic offensive forces were fairly well-balanced between the United States and the U.S.S.R. before these Soviet activities grew in intensity. The balance has been between, on the one hand, the U.S.S.R.'s advantage in missile numbers and payload, and the U.S. advantage in degree of development and deployment of MIRVs and numbers and capabilities of heavy bombers.

At the same time, Soviet writings and Soviet positions suggest that many in the U.S.S.R. believe that the developments of SS-16, 17, 18, and 19 are just what is needed for proper balance of strategic offensive forces between the two countries, but that the U.S. Trident program and the U.S. B-1 program are destabilizing in effect. For myself, I find this hard to understand, because bombers are hardly a first strike weapon in the light of the time it takes to reach their targets, and submarines remain sufficiently invulnerable, particularly when their missiles have large range, so that they are not subject to the requirement to "use them or lose them," as it has sometimes been described. Unlike

large numbers of heavy and accurate MIRV, these two weapons systems therefore seem to me not to hurt the very important objective of crisis stability. However, it may be argued that any new weapon elicits a response and therefore erodes the desirable goal of stability in the arms competition itself. It may be that the Soviet view is conditioned by concern for perceived military capability, because it is very hard to dismiss the strategic objectives of coercion of war winning from consideration in military circles even after one has concluded that they are not sustainable either in theory or in practice. I would be very happy to hear the views of my Soviet colleagues on the question of what kind of new systems on each side are likely to be least helpful to the goal of strategic arms limitation.

IV

It is hard even for experts, and perhaps nearly impossible for political leaders, entirely to dismiss concerns about the effects of strategic forces that go beyond the objective of deterrence. Because both informed and uninformed opinion in both countries may have these concerns, it seems to me that any agreement on strategic offensive forces that runs for an extended period of time needs to assure some sort of perceived equivalence overall between the United States and the U.S.S.R. in strategic offensive forces. This equivalence can apply in an overall way to numbers (for example, of long-range missiles plus bombers, or of MIRVed missiles or of MIRVs). Clearly there are different geographical and military requirements for our two countries and there have been historical differences that have gone into the development and deployment of our two particular strategic-force structures. These factors mean that the two sides cannot be equal in all measures of strategic force, except by scrapping everything and starting over with the goal of producing identical forces. Agreeing on their nature would probably take at least as long as agreeing on any other strategic offensive arms limitation. Disparities favoring one side in some things can be balanced by disparities favoring the other side in other things. But if any of these individual differences between the two sides is too great, strong arguments will be raised, on the side with less of that component, to the effect that this particular comparison is the most important criterion of relative strength. It will then be urged that a new deployment program must be immediately begun in order to redress that disparity, or that otherwise very large concessions must be made by the other side in some other category of strategic forces.

Thus, for example, the concept of throw-weight, though not needing perhaps to be dealt with explicitly, nevertheless will be one by which agreements are weighed. This could be done in terms of some kind of equivalent measure. That is, providing that the actual forces deployed under an agreement showed approximately the same throw-weight in terms of the throw-weight of missiles plus an equivalent in terms of bomber payload, the agreement would be seen as balanced. A similar comparison in terms of actual forces deployed is likely to be made, at least in the United States, of the total number of independently targetable warheads. I say this in the personal belief that differences beyond a certain number or a certain total throw-weight matter very little in real military terms, because the outcome of a

conflict is not likely to be changed very much by such differences. That outcome is in practical terms the total destruction of both sides.

V

The guidance given by the agreements reached at Vladivostok in November of 1974 is a substantial step forward. It sets limits both on total numbers of missiles and heavy bombers and on numbers of missiles that can be MIRVed. These limits are substantially lower numerically than the numbers of launchers and of MIRVed missiles that would otherwise have been built on each side. It would extend a form of agreement on all strategic offensive forces through 1985, at levels not to exceed these numbers, and calls for negotiations to begin well before that date is reached on further reductions. The delegations of the U.S.S.R. and the United States are currently negotiating in Geneva the details of an agreement based on that guidance. The details of that negotiation, involving verification and collateral constraints, definitions, and matters involving the interpretation of that guidance, are very important. Even if agreement is reached on specific language, it must be such as to be acceptable to the Congress of the United States, and to the people of both the Soviet Union and the United States. It must be such as to convince not only the authorities but the people in each country that their security is thereby enhanced. I would like therefore to say a few words about some details that are not decided one way or another by the Vladivostok guidance and about what I think is the way to proceed on those questions.

In my view, the limits on numbers of bombers ought to include those kinds of bombers, present or future, that are comparable in capability (range and payload) with those already included by definition as heavy bombers. If mobile intercontinental missiles (land-based or aircraft based) are not banned, then both must be included within the numerical limits for launchers.

In addition, I believe both sides should observe the principle that what is allowed is not necessarily compulsory. This leads to the rather delicate subject of restraint. I call it delicate because in my experience proposals for restraint have generally proceeded from the assumption that the other side should restrain what troubles the proposer, but that the proposer's own planned or under-way programs should be allowed to proceed. I will have more to say about this in specific terms later on, but first I want to put forward two or three general proposals which in my view would inhibit the rate of development and deployment of new offensive armaments.

These involve a limitation on the number of missiles (or bombers) that can be modernized or replaced each year, perhaps a limit on the number of new systems that can be introduced into the inventory during each 5-year period, and a limit on the number of missile tests that can be carried out each year. With such limits, development and deployment will proceed more slowly, and those carried out on each side will offer less justification for the other side to react and start its own new programs of development and deployment.

Without such limits, the race for more will turn into a race for better, consuming perhaps as much effort and resources. Moreover, a qualitative race can be even more unstable than a quantitative race. One need be only moderately sophisticated to see that beyond a certain

number of offensive weapons, so long as the retaliatory ones on the other side are relatively invulnerable, one does not gain in real military capability. On the other hand, a plausible argument can more easily be made in circumstances of a qualitative competition, that the new weapons of the other side, either in development or being deployed, call for a rapid and ingenious new set of developments and deployments on one's own side in order to counter them. A deeper level of analysis and understanding reveals, in my opinion, that this plausible argument is incorrect because the balance is not all that precarious. Furthermore, it takes quite a long time to develop and deploy new systems. Thus, it is not necessary rapidly to respond by developing and deploying forces designed to prevent the deployments on the other side from producing an imbalance.

Nevertheless, frightening scenarios can be made out of new deployments and deployments on the other side, and one cannot be at all confident that they will not lead to overreactions which in turn stimulate responses in an accelerating arms competition. My own view of the technology of offensive and defensive strategic arms is that such a series of developments and deployments, counter-developments and counter-deployments, both sides will still have forces that are capable only of deterrence, not of real war fighting or coercive capability. But, such a process whips up emotions on both sides, makes the calculation of outcomes more complex, and in my opinion increases the chances that a nuclear war might start.

The Vladivostok guidelines do not provide immediate substantial reductions from present force capabilities. However, I do not think we need not wait until 1985 to begin such reductions, nor until 1980 to begin negotiating them. In this regard the example of the Antiballistic Missile Treaty is instructive. As signed in 1972, it allowed each side two ABM sites. But by 1974 it was possible to reach agreement that neither side would have more than one ABM site. We may not be able to lower the limits set in the Vladivostok agreements in quite so short a time as we were able to do with ABMs. But I think it highly desirable to start working on that problem now. One reason for doing so is to take away an excuse from some nations that are not now nuclear powers but are considering becoming the possessors of nuclear weapons. Some of them are using the excuse that the United States and the Soviet Union will not reduce their forces of nuclear weapons but intend to go on building increasing numbers.

Reductions of numbers of launchers allowed, of numbers of MIRVed missiles allowed, of total megatonnage, and of total destructive power generally, can be carried a long way without eroding deterrence of nuclear war. A nuclear war would remain more than adequately terrible at far lower levels of destructive capability than we now possess.

VI

I've spoken of the process of the development and deployment of one side, and then a counter development and a counter-deployment by the other side. This counter-development and counter-deployment need not be of the same sort of weapons system. In fact, in some instances the first development and deployment have been of a stra-

tegic defensive system and the counter-development and counter-deployment have been of strategic offensive systems.

My own years of experience in the Livermore Laboratory and in the U.S. Department of Defense encompassed the period of the first Soviet MR, IRBMs and ICBMs. These, and the statements made about them in Soviet circles, greatly accelerated the U.S. Polaris and Minuteman programs. Those years also include the time of the development and some deployment of the so-called Tullinn system. Uncertainty about its function and its possible effectiveness as an ABM system played a leading part in the U.S. decision to develop and deploy MRVs as early as we did. It was while I was Secretary of the Air Force that Soviet air defense system development and deployment, including both surface to air missiles and advanced interceptor aircraft, strongly influenced the decision to develop the B-1 bomber. In view of these experiences, I believe that the Soviet SS-17, 18, and 19 MRV programs, our lack of knowledge about their purpose and the extent of their intended deployment could produce—and in the absence of an appropriate agreement from the negotiations now in process will produce—a large U.S. response, which may come not in 1975 but in 1976 or 1977 or 1978.

Many technologists are fascinated with new capabilities. Dedicated military men on both sides find it very hard to concede that they cannot protect the homeland from devastation except to the extent that deterrence will serve this purpose. The inclinations of the first group, and the convictions of the second group, need to be balanced off by other views. In the first instance, this balance must be provided by analysts who conclude that the U.S. and the Soviet Union have reached a point where a modest effort by each side can, despite major efforts by the other, continue to make the other's strategic forces unusable, either for coercion or even to gain a political advantage. Beyond that effort of the analysts, a correct national policy requires a decision on the part of the highest political authorities to override the hopes of military, political, or technical individuals who hope by further development and deployment of strategic arms to gain an advantage in the very real political competition that exists between our two countries.

As I have indicated, I believe a moderate effort by either side can continue to assure the maintenance of deterrence of nuclear attack by the other. I am convinced that this will be so even in the face of a substantial program by the other to obtain a capability sufficiently effective to reduce the effects of the retaliatory strike to an acceptable level, what is called a first strike capability. It is indeed because of this belief that I think we could go up another turn on the spiral of strategic arms competition without a large immediate decrease in the present security of the U.S. or the U.S.S.R. vis-a-vis each other. But I am convinced that it will not increase our present security to do so, and I believe that there are other penalties that both of our countries will have to pay if we proceed to reach a new equilibrium in strategic arms at a higher level of military capability. Indeed, my own strong preference is for a new equilibrium in strategic arms at a lower level.

In the first place, I think higher strategic force levels are likely to exacerbate our political differences. It will not create them, because they exist already. We are in several senses competitors, in ideology, in natural interests. But even as those differences cause the arms competition, so the arms competition in turn amplifies the political differences.

In the second place, continued arms competition diverts resources—material resources, technical resources, and intellectual resources—from serious problems that exist for us, both within each of our countries and in the rest of the world, and require for their solution all the resources that we can muster. If we fail to reach agreement on further limitation of strategic offensive arms, it is conceivable that we might lose even what we have already achieved in ABM limitation. That, it seems to me, would be very dangerous. Suppose extensive ABM deployment were to take place in both countries. In a crisis situation it would then be much easier, though in my opinion still very mistaken, for some military or technical advisors to attempt to convince political leaders that with a first strike, and some luck, the retaliatory damage would be less disastrous to the nation than the likely outcome in the absence of such a first strike. Even without extensive ABM deployment, greater complexity in arms makes it easier to lose sight of the certainty of a mutually catastrophic outcome of a substantial strategic exchange—though it makes such an outcome no less certain.

Beyond these considerations which concern the direct interaction between our countries, there is another loss which would result from failure to make further arms limitation agreements. This is perhaps the most important of all. It is the loss of time. Though we are competitors, with many conflicting interests and adversary ideologies, there are some goals we have in common. Neither of us wants to see a nuclear war, involving either ourselves or anyone else. Further nuclear proliferation, in which countries with less stable leadership, with less to lose, and likely to indulge in less rational behavior, will cause a decrease in both Soviet and U.S. security of very substantial proportions. Until we reach a strategic force situation between ourselves that is both stable and essentially equivalent, and is perceived to be so both by ourselves and by the rest of the world, we are unlikely to turn our attention—individually, together, and in various international forums—to these new problems that, in abeyance for 10 years, now crowd in upon us. I hope that we can make the progress in strategic arms limitation that we need to make in order to face and solve nuclear proliferation, the strain on worldwide production and reserves in agriculture, energy, and other natural resources, worldwide pollution, the population explosion, and other major world political problems. Because we are competitors, it may seem to some in each of our countries that gaining an advantage in the strategic arms competition can be valuable. My own view is that the attempt is a vain one. Why not then encourage the other side to make this vain attempt? The answer is that in doing so it hurts not only itself but both sides. The vain attempt exacerbates tensions. It wastes time and resources that could be used to deal with other problems, the failure to solve which is dangerous both to the United States and the Soviet Union.

STATEMENT OF DR. OTTO L. NELSON, JR.¹

In response to the invitation of Senator William Proxmire, Vice Chairman of the Joint Committee on Defense Production, I submit this statement.

¹ Dr. Nelson is a retired general, U.S. Army, who serves as consultant to University of Pittsburgh.

Hearings on the status of the national preparedness effort which the committee is conducting are, in my view, of great importance, and the committee should be commended for undertaking this difficult and essential task.

I am not sure whether it is appropriate or necessary to mention any personal data that would qualify me as an expert witness. If this is desired I can submit such information. It may suffice to say that I have been interested in this general area ever since I submitted a thesis on industrial mobilization in the United States in partial fulfillment of the requirements for a Master of Arts Degree in Economics at Columbia University in 1932. Since that time I have participated in numerous studies both within the military establishment and civilian agencies such as the National Security Resources Board, the State Department, Federal Civil Defense Administration and the Office of Emergency Preparedness. Out of these experiences has come one sobering conclusion that the answers to the questions listed in the enclosure to Senator Proxmire's letter are very complex and difficult, on which there are few, if any, experts.

For whatever it is worth, my answers to a few of the questions posed are as follows:

"Is the United States currently prepared industrially and economically to prosecute a war?"

The answer is no, or at least not adequately. A strong and healthy economy is the basis of industrial preparedness for war. Some of the major weaknesses which could affect our ability to prosecute a war are the same or similar to those of present national concern: (1) our energy insufficiency, (2) growing materials dependency on foreign sources, and (3) loss of some vital industrial base capabilities due to foreign entry into the market.

"Is it prepared in terms of civil mobilization and civil defense?"

No, and certainly not adequately. Institutionally, the functions of government agencies and offices responsible for dealing with civil emergencies of various types are fractured and misaligned. More on this later. There are also public attitudinal factors involved here. We cannot keep the American populace continuously "mobilized" for war; but we might do a better job of conditioning them to the kind of austerity and commitment they would be called to undertake in any serious emergency.

"Are current economic and civil preparedness plans and programs deficient?"

Yes. Our plans and programs are deficient in that they lack cohesiveness. There should be a pay-off between reacting to a natural disaster and training to react to war, of planning to meet crises now, such as the energy crisis, and planning for similar critical resource shortages in war. The organization of emergency preparedness in government does not enable this type of coordinated planning.

"Does the President need standby emergency powers to cope with nuclear attack?"

Yes. The President needs standby authority to respond to a nuclear attack and to cope with the problems it produces. I am not sure he now possesses the necessary legal authority because I do not pretend

to be fully informed. In any event, it would be highly useful if his authority to do this could be clarified and probably extended.

"Should the Congress participate in emergency planning?"

Yes. One inhibition to effective emergency planning is that there is no Congressional focal point concerned with the total subject of civil preparedness. Budgets of different Federal agencies having emergency responsibilities are considered by many different Congressional committees, never as a government-wide program. There is no central Congressional oversight of emergency preparedness policies and goals—oversight which could provide the basis for effective coordination and support of a balanced government-wide effort. Congressional action to strengthen its own capabilities in these regards could lead to greatly improved preparedness planning at all levels of government.

Rather than attempting to respond in detail to all the questions included in Senator Proxmire's letter, I should like to comment on the organizational concept and framework and the operating procedures needed to provide an ongoing capability to provide some of the answers in that broad field which is vaguely defined as "nonmilitary defense" or as "the essential economic base needed to support our military forces and the economic and political measures needed to sustain the fabric of our civil economy and population."

There are a few principles or concepts that may be overly simplistic but that are important. The Department of State should have the responsibility of a continuing assessment of foreign developments that threaten world peace and pose the problem of involvement by the United States. The Defense Department has the responsibility for recommending the size and composition of the military forces needed for the military defense of our country. So, too, is there needed an organization and a capability on the part of our Federal Government to assess on a continuing basis and to recommend what provisions should be made to develop and maintain the economic base and organizational framework needed to assure the survival of our civil population and our industrial, governmental and "morale" capabilities in time of war or other crises or emergencies. Such an organization and capability should be outside of and not a part of the Defense Department for a number of reasons, the major of which is that civil preparedness is by nature a civil function. In a war or other similar emergency the Defense Department has all, and perhaps more than, it can handle so the concept should be to remove from the Defense Department all responsibilities and activities that can be carried out by other agencies of the Federal Government. More importantly, the Defense Department will always be an important claimant of our economic resources, and it should not be in a position of being both a claimant and the judge or allocator of such resources. An impartial assessment is needed on what can be supplied and what are the minimal or ongoing needs on the part of our economy or society to support the military establishment and to ensure the continuing capability of our economy to do this.

A further concept or promise is that no one organization or agency in our Federal Government can do this all on its own. Rather, almost every department and agency should have the responsibility and capacity to do that part of the job which is related to their every-day

ongoing duties. To go even further, numerous governmental agencies at the State, local and Federal level have, or should have, an emergency or crisis role as an extension of their everyday duties and responsibilities. What is needed is for this to be spelled out and organizational means developed to assure that this is done, that the work is monitored to assess performance, and that the pieces are put together on the basis of some workable coordination effort. All this I believe can be done at a very modest cost if the principle is established that in addition to their routine everyday task there is an emergency or crisis role of any type that represents an added dimension to their daily responsibilities and duties.

I would be remiss if I did not say that there are dedicated and able people in government at all levels that are trying to do what I have attempted to describe in very general terms. However, I believe that these individuals are handicapped by the lack of organizational arrangements which the Congress should remedy. More specifically, there are two organizations, one at the Federal level which are attempting to do aspects of this overall job, neither of which has adequate authority or organizational status to carry out the coordination needed. What I have in mind is not an organization that is submerged in the Defense Department or the General Services Administration, but rather one that is akin to the concept underlying the National Security Resources Board, which under the direction of Jack Gorrie and with the strong support of President Truman, did attempt to fulfill the role I have sketched. Such an organization in my view must be in the Executive Office of the President, and the concept must have the support of the Congress if it is to delineate, assign and monitor the work that is to be done. Simply said, this is merely the application of the time-honored management rule that you break down a complex task into manageable parts, you assign these tasks to organizations or groups that have the capacity and competence to do them, to monitor and supervise their performance, and to put together, evaluate, implement and modify as conditions dictate the overall end product.

I would go further by suggesting that present arrangements at the State and local levels are hopelessly outmoded and obsolete. Much of our present arrangements on civil defense at the State and local levels should be changed drastically. The role of the State Adjutant Generals and the National Guard needs to be reconsidered in view of the fact that the concept is that the National Guard and certain Reserve units are regarded as a "ready reserve" to be withdrawn from their geographical areas and deployed immediately as part of any military effort. As a start the Federal Government would be well advised to provide matching funds at a 70 percent or 80 percent level to encourage each Governor to appoint a special assistant who would be a civilian and a part of his immediate office who would carry out the coordinating role at the State level, the role which I have suggested be done at the Federal level by a small coordinating office in the Executive Office of the President. Such an individual and such a small office at the State level would be concerned on a day-to-day basis with coordinating the long-range plans of the State to develop a viable, healthy economy and environment. The extra dimension would be the assignment to develop and carry out the plans and the coordination needed for all types of emergencies in war and peace.

In concluding, may I stress that I am not advocating any utopian planned society. However, there always has been and will continue to be an appropriate governmental role in our entrepreneurial society. What the Government subsidizes or does markedly affects economic development. Government, immersed as it is in day-to-day problems, nevertheless has an important input and contribution to make in developing long-term guidelines and in supporting healthy long-term growth. Increasingly as we recklessly consume our natural resources and become more and more a "have not" nation we must not at our peril ignore the husbanding and judicious use of our resources and the development of acceptable substitutes. Most of us realize that in the feasible future the United States is not apt to be defeated on the battlefield - rather internal decay, disintegration and inability to cope with long-range problems of defense and domestic economy are more apt to bring this nation to its knees.

STATEMENT OF E. P. WIGNER¹ FOR THE JOINT COMMITTEE ON DEFENSE PRODUCTION

As will soon become evident, the present writer is strongly in favor of a great enhancement of the civil defense effort of the United States. He appreciates the opportunity to communicate his views to the distinguished readership of the Congressional Record.

The discussion which follows assumes that the conviction that our country needs an effective defense is shared by the readers. Actually, this conviction is most effectively communicated by the writings and statements of the leadership of the U.S.S.R. These strongly express the intention to extend their reign over the whole earth. It is, I hope, unnecessary to enlarge further on the necessity of our maintaining a strong defense system and I'll proceed to the other subjects of interest in the present context: the effectiveness of civil defense measures, the need for the United States to institute such measures, the validity of arguments against these measures, and a few final recommendations.

THE EFFECTIVENESS OF CIVIL DEFENSE

This writer became convinced of the possible effectiveness of civil defense measures when he served as a member of the General Advisory Committee to the U.S. Atomic Energy Commission. The Committee met four or five times a year and was briefed at almost every meeting on the progress of nuclear weapons development and on the effectiveness of these weapons. These briefings convinced me of the fact, so aptly stated by V. Chuykov: "Although the discussed means of destruction (nuclear weapons) are called mass means, with knowledge and skillful use of modern protective measures they will not destroy masses of people, but only those who neglect the study, mastery, and use of these weapons." Indeed, an easy calculation shows that if the U.S.S.R. carries out its city evacuation plans, the total number of casualties that all the nuclear weapons in our missiles could cause would be a good deal

¹ Dr. Wigner is a Nobel Laureate and an emeritus professor of physics at Princeton University, and has long been associated with civil defense issues. He edited a 1968 study *Who Speaks for Civil Defense?*

less than one-half of the losses they suffered in World War II. A reasonable estimate, based on the Oak Ridge tests of the blast resistance of the "expedient shelters" described in the U.S.S.R. civil defense handbooks gives, for the loss which our missile carried nuclear weapons could cause, about 3 percent of the U.S.S.R. population. It is true that if their very elaborate but hopefully incomplete air defense system lacks in effectiveness, this loss could be very significantly increased by our air power. However, very naturally, we cannot foresee the future development of their air defense installations. It may be useful to mention at this point that a recently published book, by L. Gouré, describes the Soviet civil defense very closely and deals with all aspects thereof—not only the immediate survival of the attack but also with its longer time effects.

What is our own situation? According to the published part of the Ponast II study, the missiles of the U.S.S.R. could inflict, in the present situation, a population loss of 45 percent. An evacuation plan, similar to that of the U.S.S.R., would reduce that loss to about 11 percent. Its cost is estimated by Ponast II as \$1.2 billion. The evacuation of our cities would thus be very effective, but less effective than that of the cities of the U.S.S.R., partly because of their greater missile power, partly because a larger fraction of our people live in cities than of those of Russia. Still according to the Ponast II study, a blast resistant shelter system, similar to that of China, would reduce the number of people exposed to mortal danger to about 5½ percent—it would cost around \$35 billion.

Are the U.S.S.R. and China the only countries with elaborate and well developed civil defense systems? No—most of the peace-loving countries also have such systems, based on blast shelters, and their yearly expenditures per person on such defense is about 15 times greater than ours. This has been, so far, about 40¢ per person a year. Incidentally, the Swiss civil defense repeats our President Kennedy's message: (Civil defense) "is insurance we trust, will never be needed"—its greatest accomplishment is, according to the Swiss, that it will *not* have to be used, that it will divert the aggressive instincts of possible opponents.

It is easy to conclude that an effective civil defense is not only desirable, it is also possible.

IS CIVIL DEFENSE NECESSARY?

What is the principal danger that threatens us in the present absence of an effective civil defense? It is the possibility of the U.S.S.R. evacuating its cities, dispersing their population, and then making demands on us, under the threat of a nuclear attack, approximating those made by Hitler or Czechoslovakia which led to the Munich pact. This left Czechoslovakia essentially defenseless.

Could we resist such demands? The lives of almost half of our people would be at stake and the threat of our retaliation, which would affect a relatively small part of the U.S.S.R. population, might be quite ineffective. The natural response to the threat envisaged would be either a "counter-evacuation", to be undertaken as soon as the U.S.S.R. evacuates its own cities, or, even better, the movement of our people when the threat arrives, into blast resistant shelters, similar to those avail-

able to the Swiss, or even the Chinese. It is hard to imagine any other countering of the "nuclear blackmail" threat envisaged, and the ones proposed would, in fact, have the effect that the threat would not arise. As the Swiss were quoted, the most important accomplishment of a potentially effective civil defense system would be that it never will have to be used.

What would be the other consequences of effective civil defense preparations of our country? One can well maintain that they would further a more sincere peace between ourselves and our antagonists than the much advertised "mutual assured destruction". If of two people each can kill the other, but is then endangered by the threat of being killed himself, they may resist murdering each other. But their relation would remain much more strained than if neither would have to fear being murdered by the other. Further, an effective civil defense system would also have a very favorable effect on the morale of our people—they would feel very directly that our government does have their welfare and life in mind and the universal contribution of the people to the aversion of dangers to themselves would greatly improve their morale. Civil defense is not only necessary, it is also desirable in its effect on the morale of the people and also in its effect on our relation to countries at present antagonistic.

THE ARGUMENTS AGAINST CIVIL DEFENSE

It may be worthwhile, finally, to review the objections against our installing an effective civil defense. About 15 years ago, before the U.S.S.R. civil defense efforts became clearly apparent, it was claimed that the installation of effective civil defense measures would create the impression in our opponents that we are planning a first strike. This argument, that our civil defense effort would be provocative, had to be abandoned when the U.S.S.R. organized its own civil defense. Interestingly, and incidentally, the U.S.S.R. was never criticised for these efforts—naturally not by the supporters of our own program in this direction and strangely enough also not by the opponents thereof. The argument which we heard after the U.S.S.R. civil defense efforts became generally apparent was that our installation of protection for our people would only induce the U.S.S.R. to augment its aggressive capability. We now know that such augmentation took place even though we did not organize a vigorous civil defense effort. One of the two arguments we now hear, the civil defense is too expensive, seems almost ridiculous. If Switzerland, Sweden, etc., *China*, can afford the more costly, the blast shelter method, we with the highest per capita national wealth, can also surely afford the defense of our people. The other argument, in the words of one of the most learned opponents of civil defense, S. Drell, is that it would lead to an "escalation of the apprehension from the mood of today, vis-a-vis the dangers of a nuclear exchange between the U.S. and the Soviet Union." Should the apprehension of the danger not be greater now, where we have no effective defense, than it would be when we have such defense? Or is it proposed that we should lull the common people into ignorance of the true situation? It is remarkable also that the U.S.S.R. is not criticised for fostering the "apprehension" of its own people. One must conclude that the varying arguments against civil defense have little validity.

A FEW PROPOSALS RELATED TO OUR DEFENSE

The first change I would advocate is to stop maintaining that a nuclear war would be the end of mankind. Such a statement may give the impression to an opponent that he can achieve anything by threatening with a nuclear war. After all, he would argue, the opponent (that is us) will make any sacrifice to avoid the "end of mankind". Hence, if he is threatened with extinction he will give in, particularly if the threat comes from a party which does not believe that the war precipitated by him will lead to the "end of mankind". Instead of such a blatantly incorrect statement, it would be better to subscribe to Chuykov's doctrine that "knowledge and the skillful use of modern protective measures" will make it possible to provide effective protection. At least, we should adhere to Kissinger's earlier (1957) statement: "While it (civil defense) cannot avert the traumatic effect of vast physical destruction, its efficient operation may make the difference between the survival of a society and its collapse."

The second measure which I consider to be urgent is to establish better contact with the people at large. This makes it desirable for DCPA to expand its staff by the employment of people who can establish a contact with the population at large, who can speak and write the truth convincingly. One of the functions of these advisors would be to help the high schools to give instruction on the nature of nuclear explosions and the defense against the effects of these. This is a subject which is foreign to most present high school teachers, and the advisor could and should help them to acquire the necessary knowledge. After all, the Federal Government now intends to support the local schools and can well suggest that these contribute to the protection of the country. The high school instruction on civil defense--obligatory in the U.S.S.R.--would be very useful since, after all, we learn best when we are young and we learn most non-elementary facts from our teachers. But even more generally, the establishment of a close contact between those who protect our freedom, and those whose freedom is protected, would be very desirable; and acquainting people at large with the methods and effectiveness of civil defense would provide an avenue toward this goal. It may not be easy to find people who know about the methods and effectiveness of civil defense and who are also able and interested in communicating this and much other knowledge to the people at large, but every effort should be made to find such people and support them.

The last suggestion I wish to make is that the DCPA budget should certainly not be cut. It should steadily be increased until, in a few years, it reaches the per capita level of other peace-loving and non-expansionist countries, such as Switzerland, Holland, Sweden, etc. For reasons given in the rest of my statement, this would be of decisive importance for maintaining a valid, widely endorsed, and vigorous defense effort for our country--and it would support all freedom directed nations. Their independence does depend to a certain degree on our strength and our ability to stand up for them. The examples of Hungary, Czechoslovakia, Poland--to mention only a few--show that such independence does not come freely.

Let me end on a bit more hopeful tone which is, however, as sincere as was the rest of my statement. This is the hope that an effective civil defense may not only protect our country and our freedoms, but it may

also lead to a more true peace than the present one, which is based on the fear of destruction. I hope such a peace in which no rulers are tempted to increase their domains will come into being!

STATEMENT OF GERARD C. SMITH¹

I propose to discuss this morning some of the arms control implications of Vladivostok as well as certain related aspects of the current Defense budget submission.

I. THE VLADIVOSTOK ACCORD

At the start let me say that I put forward these ideas tentatively, not categorically. I question that anyone can speak with certainty about the slippery issues surrounding strategic arms and their control. I admit to a bias in favor of a very strong defense but I believe that arms control can also advance the security of the United States and the world whether or not there is some relaxation of tensions between the U.S. and the U.S.S.R.

The Vladivostok accord should not be judged in and of itself—but in connection with the limit on defensive systems (ABMs) agreed upon in 1972 and other American-Soviet agreements relating to arms control. It may help in judging the significance of Vladivostok to see that accord as part of a process that has been going on for more than five years. The general strategic dialog of the 1960s led to the specific SALT exchanges of 1969-72 at Helsinki, Vienna, Washington, and Moscow. Gradually the two sides developed somewhat better understanding of each other's strategic preoccupations. Concerns about accidental or miscalculated nuclear hostilities led to the first two SALT agreements in 1971—on measures to reduce the risk of outbreak of nuclear war and on measures to improve the Washington-Moscow direct communication link or "Hot Line." In 1972 there was the major breakthrough, the treaty limiting ABMs to two sites apiece, accompanied by the interim agreement to freeze offensive launches at the approximate levels of 1972. These were followed in 1973 by the Nixon-Brezhnev agreed principles for offensive arms limitation and in 1974 the ABM Treaty levels were reduced to one site apiece. At year's end the Vladivostok accord foreshadowed limitations on offensive systems which although of relatively short duration may be considered as a counterpart of the ABM Treaty. In judging this latest agreement one should consider the cumulative effect of the entire SALT process which hopefully can be considered as a preparatory stage for the natural next steps—reduction in offensive force levels which the sides are now committed to negotiate and some limitation on improvements in weapons characteristics. A total ban on ABM systems should also be reconsidered.

I would not favor interrupting the current Geneva negotiations by introducing a proposal for reductions. I do not believe that reductions are negotiable now. The Soviet position since 1968 has called for first a limitation and subsequently for reductions. When and if

¹ Mr. Smith is the former Director of the U.S. Arms Control and Disarmament Agency and chief U.S. representative in SALT I. He is now in private practice with the law firm of Wilmer, Cutler, and Pickering. His statement submitted to the Joint Committee was originally delivered to the Senate Foreign Relations Committee in April 1975.

the Vladivostok accord is converted into a definitive agreement the U.S. should promptly table a reduction proposal such as its 1970 SALT call for reducing strategic force levels by 700 launchers.

I think Vladivostok marks progress because the Soviets agreed that both sides should have the right to deploy an equal number of strategic launchers. This involved a Soviet withdrawal from its position maintained for more than five years that the alleged American advantage in forward based systems justified some Soviet advantage in numbers of strategic launchers. It also involved the waiving of the Soviet claim that U.S. submarine bases in Europe and French and British ballistic missile submarines justified larger strategic forces for the U.S.S.R. We probably have not heard the end of this F.B.S. argumentation. When one gets into reduction negotiations it is to be expected that the Soviets will revive this issue.

A word of caution—it will not be easy to convert the Vladivostok general accord into a definitive agreement clearly spelling out the details of what is controlled and how. There is a tendency to take for granted that there will be a successful outcome to the current Geneva negotiation. This is a poor background for any international negotiation.

The limitation on launchers at 2400 is admittedly high. But it is about the level that U.S. strategic launchers reached over 10 years ago. It is not far from the number that we would have settled for in 1971 during SALT I. It is substantially lower than some U.S. intelligence estimates of Soviet forces projected out to 1955 in the absence of agreement. If the Vladivostok accord evolves into a formal limitation agreement the United States will have good assurances of the maximum number of Soviet launchers over the next decade. That should eliminate what has been a driving force behind the strategic arms competition— from the American standpoint—uncertainty as to what Soviet future force levels would be. The elimination of this uncertainty should be a factor for stability in the American-Soviet strategic relationship.

I think the MIRV limit of 1,320 launchers is less significant but I would recall that during 1969-1972 the U.S. would have settled for an offensive agreement with no MIRV limitation at all. It seems clear that the Soviets have a capability to deploy many more than 1,320 launchers for MIRV missiles if not restrained by agreement. But it also seems clear that our hopes of moderating the threat to Minuteman by a MIRV control arrangement have not been fulfilled.

II. MINUTEMAN VULNERABILITY

As this subcommittee well knows Minuteman vulnerability has been a concern for a number of years. Recently it seems to me the Pentagon has been issuing rather uncertain signals on this score. For instance, testifying before this subcommittee on March 4th of last year, the Secretary of Defense said, "There is just no possibility that a high confidence disarming first strike is attainable for either side even against the ICBM components of the strategic force on both sides." In January of this year at a press conference he said it should multiple missiles be "massively deployed" by the Soviet Union this would be a "potential source" of strategic instability and the U.S. would have to watch to determine whether "to take countermeasures to maintain the strategic balance."

In the statement of the Director of Defense Research and Engineering to the Congress this year, speaking of the proposed U.S. advanced ICBM, Dr. Currie said, "The pace of this program has been significantly reduced as a result of our judgment concerning the time scale of the threat to land-based ICBMs . . ." But in the same report he says, ". . . there is little question that our present land-based missiles deployed in fixed silos could be in jeopardy by the mid-1980's. The severity of this threat definitely has increased in the last year and my concern has consequently deepened." He seems to be saying in these two statements that although the proximity of the threat is lessened, its severity has increased. I suggest that this subcommittee make an effort to clarify present estimates about the future vulnerability of the Minuteman force and its significance. If the Minuteman force is to become so vulnerable that it cannot be relied upon even for the somewhat lessened role that the present concept of the Triad requires, it is hard to understand the substantial effort that we are proposing to make to develop a new ICBM especially if it is to be deployed in a fixed silo. If it is to be a mobile missile (and I note that General Brown in his report to the Congress states that mobile missiles will be permitted under the Vladivostok ceilings) would it be helpful in carrying out any "hard target" aspect of the "new strategy" of flexible response that we are pursuing? On this score I note that General Brown at page 15 of his statement says, "Reliability, accuracy and availability are reduced considerably by the problems inherent in mobility while operating costs including maintenance, security, and positive control are substantially higher than those associated with fixed deployment." This hardly seems to be a good basing method for selective strikes. In any event the Minuteman vulnerability threat continues to be seen as a relatively long range future problem and not an unlimited danger to American ICBMs.

III. MOBILE MISSILES

I am sorry to hear that mobile missiles are to be allowed under the Vladivostok formula. You will recall in SALT I that we made a major effort to rule mobiles out and when the Soviets would not agree the United States made a formal statement "that the United States would consider the deployment of operational land mobile ICBM launchers during the period of the interim agreement as inconsistent with the objectives of that agreement." I feel that the Soviets would get more advantage out of land mobile missiles than the United States. The U.S.S.R. has substantially more uninhabited real estate and it has a population that is not in a good position to object to weapons deployments. I believe that if the United States decides to deploy mobile ICBMs, there will be popular reaction similar to that in 1969 to proposed deployments of ABMs--even if the deployment is limited to military reservations. There may also be a verification problem in keeping accurate track of the number of mobiles deployed by the U.S.S.R.--especially if the so-called garage technique is used.

IV. THE NEW STRATEGY AND CIVIL DEFENSE

I am concerned about the effect on the prospects for arms control of the United States moving more to an ICBM silo busting strategy. The general assumption behind the ABM Treaty was that with both

sides possessing a capability to destroy the other, nuclear war could be deterred and that efforts to blunt a nuclear attack by missile defense could be destabilizing and in a crisis could set up pressures for a first strike especially if populations were defended. I believe a limited strategic counterforce strategy could produce a similar result.

To make such a strategy credible the Secretary of Defense correctly has concluded that population protection from fallout will be necessary and the current defense budget calls for a development program which foreshadows a major shelter program in the years to come. Secretary Schlesinger says in his report to Congress: "One would expect that the recent shift in emphasis toward a more flexible strategic response policy . . . would be reflected in our civil defense program. That is indeed the case. We are seeking to reflect in our civil defense planning the wider range of response options that we are now introducing into our military planning." He then goes on to point out that the Soviet Union has given a good deal of attention to civil defense with shelter construction and plans for evacuation of a bulk of the population from major cities in the event of a crisis. He says, "We believe the United States should have a similar option for two reasons; (1) to be able to respond in kind if the Soviet Union attempts to intimidate us in a time of crisis and (2) reduce fatalities if an attack on our cities appears imminent." I think that the Secretary of Defense's discussion of the shelter program requirements is well worth the attention of this subcommittee. It starts at page II-54 of his statement. In past years we have pursued a small civil defense effort as a kind of improbable contingency program but if civil defense is to become essential to the credibility of our new nuclear strategy we shall have to expect a major effort in this direction. A decision to enter a civil defense competition between the U.S. and the U.S.S.R. would need very broad support by the American people. Coming just after SALT agreements which are said to have reduced the risk of nuclear war a major civil defense program will need a great deal of explanation. Perhaps this is necessary but I think we should enter such a program only with our eyes wide open to its implications.

There is one additional possible concomitant to the new strategy that I think warrants attention. As we get into a major civil defense program I think pressures will build up to abrogate the ABM treaty. It may seem illogical to be making major evacuation plans while depriving ourselves of the ability to directly protect our population by active defenses.

In addition to the possible loss of the ABM Treaty and the necessity for a major fallout shelter and evacuation program I notice that Mr. Currie at page V-10 refers to "the fact that we could in principle launch our ICBMs upon unequivocal warning . . ." If we are contemplating the possibility of striking the Soviet ICBMs in a limited strategic war with the reciprocal possibility of their first striking our ICBMs in a limited strike this, to my mind, pernicious concept of "launch on warning" will probably again become a matter of interest.

I am not arguing that there is no need to be concerned about the very large Soviet ICBM buildup with the prospect of a good part of these launchers having MIRV'd missiles in the future. But the Soviet deployment strikes me as a form of psychological pressure by

which the U.S.S.R. aims to get political value from a form of military power for which there can be no other rational use. Over the years the United States by many statements has proved how sensitive it is to this modern form of "force in being." Although it violates our ideas as to how the Soviet-American strategic relations should be managed, it does not seem surprising that the U.S.S.R. continues to press on this sensitive area.

I question whether trying to match the Soviet ICBM force would be a sensible course. One can assume with some confidence that the U.S.S.R. would not react to such an American deployment with statements expressing concern about the resulting vulnerability of the ICBMs. Perceptions around the world about the vulnerability of U.S. ICBMs that may have been generated by American statements would likely persist unmatched by similar perceptions about Soviet ICBMs.

Would it not be better to moderate our annual expressions of concerns about Soviet ICBMs and get on with modernizing those elements of our strategic forces not threatened by Soviet ICBMs. Last year's clear acceptance of the Triad concept as not requiring each of the three components of U.S. strategic forces to be an independent deterrent for *c* seems a step in the right direction. And if as the Secretary of Defense says the U.S.S.R. cannot mount a disarming first strike against Minuteman would it not be as reasonable to learn to live with their vulnerability to a lesser than disarming strike as to live with the present vulnerability of our cities?

V. UNITED STATES IN A REACTIVE PHASE

I am struck by the fact that we seem to be in a reactive phase of strategic policy and programming. In past years I had the impression that the United States had the initiative in weapons design and strategy. Now we seem to be reacting more to Soviet moves. For example, since the Soviets seem to be deploying a force which may put our ICBMs in jeopardy in the 1980s we are taking preparatory steps to "match" it. The Soviets seem to be developing mobile ICBMs. We are preparing the way for such a force. It is said that the Soviets may be developing a strategy of selective use of nuclear weapons in a limited strategic nuclear war. We should follow suit. The Soviets have elected to have large throw-weight missiles. We may have to do the same—even though in the late 1950s we deliberately decided not to go that route.

It does not seem unfair to ask—if the U.S.S.R. starts to deploy battleships should the U.S. recommission its battleships? The U.S.S.R. has civil defense plans for evacuation of civilians. We should prepare to do the same—all this in good part to avoid perceptions abroad and at home that we may someday be second best. It seems to me that this concern has a large potential for being a self-fulfilling worry. People read and hear constantly about American concerns as to its strategic forces. The Soviets do not talk this language. People constantly read and hear from American sources about the threat from very large Soviet ICBMs and how American leaders in the future might have to give in to Soviet coercion, unless our weapons and strategy are changed. It would not be surprising if after years of this sort of public output people might begin to believe that U.S. strategic forces had lost their capability to deter war.

On this very important question of how people abroad and at home will perceive the relative strength of the American and Soviet strategic forces in years to come I am struck by the fact that in recent months it is our defense leadership that has done most of the estimating of future perceptions—estimating the future psychology of peoples is difficult business at best—and one in which nondefense officials, one would think, would have greater expertise. We have missed Presidential foreign policy reports in 1974 and 1975 which should be the best vehicle for such gazing into the murky future. Let us hope this practice will soon be resumed.

Admittedly our Defense officials have a hard job to convince a somewhat complacent public of the need to support a very strong military establishment. It is no way aim to make this task more difficult. But I recommend that much more be said about the immense and persisting deterrent power of our strategic forces.

CONCLUSIONS

In summary, I have tried this morning to make the following points:

The Vladivostok accord if converted into a sound agreement will mark another step in the long process of bringing strategic arms under control.

The Minuteman vulnerability problem needs continuing clarification. The threat to this force apparently is not near term and admittedly it is not possible for the U.S.S.R. to destroy this force.

Mobile ICBMs do not appear to be a good way to meet the vulnerability problem and their deployment could result in an advantage to the U.S.S.R.

The new U.S. strategy to be credible will require a major civil defense program. Will Americans support such a program?

U.S. strategy and development programs seem unduly reactive to Soviet moves and our rhetoric too defensive.

WASHINGTON, D.C., July 21, 1976.

HON. WILLIAM PROXMIRE,
Vice Chairman, Joint Committee on Defense Production, U.S. House of Representatives, Washington, D.C.

DEAR MR. SENATOR: In response to your letter of April 8, 1976, I am glad to submit the following comments. Those comments will necessarily be in general terms since I am no longer actively engaged in detailed studies which would enable me to be of help to you in response to the specific questions attached to your letter.

I was, of course, deeply engaged in the general area in 1957 at the time of the Gaither Panel's study and I thank you for sending me a copy of the declassified Report. In re-reading it for the purposes of your committee, I am still of the opinion that based on the available intelligence and the status of our alert forces, that the Panel's recommendations were appropriate and useful. There was, indeed, reason for concern about our capabilities for defense against what appeared to be the U.S.S.R. missile delivery capability.

As to the civil defense portion of that Report, a distinguished group of experts at that time and in those circumstances, believed that such a program was, indeed, a highly desirable supplement to our own lack of operational missile delivery system.

Overall, I still believe our recommendations in Apperix E particularly were of great security value.

Sincerely yours,

WILLIAM C. FOSTER.

P.S. More detailed comments on the subjects of limited nuclear war and civil defense are attached.

STATEMENT BY WILLIAM C. FOSTER

I appreciate your kind invitation to submit, for the record, my views as part of the Joint Committee's study of Civil Preparedness and Limited Nuclear War. My observations are as follows:

I. LIMITED NUCLEAR WAR

A great deal of the renewed interest in the subject of civil defense in the past few years is the result of the adoption of a concept of nuclear strategy by the United States which assumes that a strategic nuclear war can be fought and resolved in a limited manner. This concept of "limited nuclear war" suggests that a nuclear war between the U.S. and U.S.S.R. need not end in the total destruction of each nation, that both sides would recognize that it is in their own interest to limit their nuclear strikes to only military targets; and that the number of casualties resulting from a limited nuclear war would be significantly lower than those from a large-scale nuclear conflict. The integral relationship between the new U.S. concept of "limited nuclear war" and U.S. civil defense planning is illustrated by many current U.S. civil defense programs such as the U.S. planning for the evacuation of civilian populations located in or near high risk target areas such as bomber bases.

To the degree that current U.S. civil defense programs are based upon the concept of "limited nuclear war," I believe they are based upon false and misguided premises. The strategy of limited nuclear war is not only infeasible but dangerous.

The limited nuclear war concept is dangerous because it increases rather than diminishes the likelihood of nuclear war. By creating the illusion that nuclear war can be fought in a limited or controlled manner, this concept makes the consequences of nuclear war (or the risk of nuclear war) appear less unacceptable. Consequently, the level of nuclear deterrence is lowered.

Another way in which the likelihood of nuclear war is increased is due to the fact that as both sides begin to improve their counterforce capabilities, their land-based ICBM forces will become increasingly vulnerable to a first strike attack. The existence of mutually-vulnerable ICBM forces will create strong pressures during a future crisis situation for either side to launch a preemptive nuclear counterforce strike out of fear that the other side is preparing a first strike. In such a situation each country will perceive that it is faced with a decision to either "use" its ICBM force for a counterforce attack or "lose" it to a strike by its opponent. Furthermore, the vulnerable ICBM force of the opponent will present tempting, high-value targets for a preemptive first-strike while only offering "empty silos" to a second-strike response. Complex strategic factors such as

these are the second reason a limited nuclear war concept is a dangerous strategy.

A final means by which the limited nuclear war concept is adding to the danger of nuclear war concerns the increasing acceptance of a dangerous "launch-on-warning" doctrine by many U.S. defense officials. A launch-on-warning doctrine in this case is a means by which a nation might attempt to protect its vulnerable ICBM force by planning to launch its missiles upon receipt of strategic warning that its opponent has initiated a first strike attack and prior to the arrival of the warheads at their targets. The fatal flaw of this doctrine is that it depends for warning upon technical and human means which would be susceptible to breakdown or the sending of a false alarm. Furthermore, the 15-20 minutes available for making the decision to-launch on warning is far too short for adequate presidential consideration of such an important decision. Reasons such as these led to the U.S. policy to maintain only strategic weapons systems capable of "riding out" a counterforce attack. Yet the present concept of limited nuclear war has led to a dilemma where the U.S. does not want to maintain weapons vulnerable to a counterforce attack (such as land-based ICBMs) but it must maintain exactly these vulnerable forces if it is to have an effective counterforce capability, since ICBMs are presently the most potent counterforce weapons. Consequently given the acceptance of the validity of the limited nuclear war concept as U.S. policy, there is likely to be an inevitable drift towards acceptance of some form of launch-on-warning doctrine. Indeed there has been increasingly open discussion by some U.S. officials of the possibility and even desirability of the U.S. adoption of the doctrine even though only a short time ago the concept of launch on warning was viewed as unacceptable. One of the most explicit statements was that of Air Force Secretary Thomas C. Reed in a recent article in **AIR FORCE MAGAZINE**. After pointing out that "our ICBM force could be launched in retaliation before the first wave of enemy warheads began detonating on our missile fields." (Footnote p. 61) Secretary Reed later concluded that the "availability of a Presidential option to launch on certain warning could be a much less expensive way of maintaining our ICBM deterrent, when compared to some of the more expensive ICBM releasing alternatives." In my opinion, this increasing tendency to accept a launch-on-warning doctrine is one of the most immediate and serious dangers created by the limited nuclear war concept.

Not only is the concept of limited nuclear war dangerous, but it is also infeasible and unrealistic. The feasibility of the concept can be questioned on its assumption that a limited nuclear war is unlikely to escalate into a full-sledged conflagration. In contrast, I believe that once even a small number of strategic nuclear weapons has been detonated there will be tremendous pressures for escalation. As I mentioned previously, there will be strategic pressures to launch preemptive and follow-on nuclear strikes in order to limit damage and reduce the enemy's war-fighting capability. Furthermore, this deadly strategic duel could attain a momentum of its own. Inherent pressures will exist for each side to choose to escalate the nuclear exchange in order to raise the nuclear "ante" and the risk of full nuclear war rather than to back down and accept defeat.

The limited nuclear war concept also tends to ignore other significant problems. One set of problems will result from the great uncertainties and unforeseen events that are bound to exist in a nuclear war situation. It is not known for certain what impact a large number of nuclear detonations might have upon the command and control systems or how leaders might react under such enormous emotional and political pressures. Predicting the reaction of the U.S.S.R. during a limited nuclear exchange would also involve great uncertainty. Soviet strategic doctrine does not discuss the concept of limited nuclear war and places great emphasis upon large, rapid preemptive-type attacks. To assure as some have suggested that during the "moment of truth" of a nuclear war, the U.S.S.R. will discard the traditional doctrine and accept the concept of limited nuclear war is to indeed make a large assumption.

Finally, I would also suggest that the scenarios evoked by the proponents of limited nuclear war are unconvincing and unrealistic. No administration official has adequately explained what political or military interests would compel the Soviet Union to stake its national survival upon a counterforce first-strike which would still leave the U.S. with thousands of nuclear warheads and bombs upon nuclear missile submarines and strategic bombers on alert. Furthermore, it is worth noting that in 1975, the Defense Department backed away from its initial, overly-optimistic estimates that a full-scale Soviet counterforce attack upon the U.S. ICBM force would result in as few as 800,000 fatalities. After closer study by an ad hoc committee of the congressional Office of Technology Assessment, Defense officials revealed that expected fatalities could range as high as 10 to 20 million. Even more interesting was the fact that in every one of the Defense Department's postulated attacks a significant number of Minuteman ICBM's survived. This thereby raises the question of what political or military sense such an attack had in the first place.

The means for developing and maintaining an adequate nuclear deterrent are not through the adoption of a concept of limited nuclear war, a doctrine of launch on warning or civil defense plans for crisis evacuation. Rather they are the combination of meaningful arms limitations and wise decisions concerning the types of weapon programs which would reduce the vulnerability of our strategic forces and enhance our confidence in our nuclear deterrent.

II. SOVIET CIVIL DEFENSE PROGRAM

Another point I would like to address is my increasing concern over statements that have been made by some present and former government officials concerning the threat to the U.S. deterrent from the Soviet civil defense program. It is my impression that while the Soviet civil defense program requires our continuous attention and study (as do all Soviet defense activities), some individuals have seized upon Soviet civil defense programs in an attempt to frighten the American people into supporting certain policies or programs. I deplore any attempt to scare the American people into accepting new programs or policies. I believe they can be persuaded by wise leadership to support a policy or program based upon its own merits.

I find it difficult to understand why the administration would have reduced the funding and manpower of the DCPA by nearly 25%

between FY76 and FY77 if it took Soviet civil defense programs so seriously.

I am not an expert on the Soviet Union's civil defense program nor can I determine just how effective or ineffective it really is. I do feel that the effectiveness of the Soviet Union's civil defense has been overdrawn by some analysts. Consequently, I would like to make a number of comments on my initial impressions on this question.

Some analysts and officials appear to me to have taken Soviet publications on civil defense too literally, thereby accrediting the program with a great effectiveness it probably does not have. It is not news to anyone that on paper the U.S. civil defense program is quite impressive too—but that there is a large gap between a paper capability and a real one. There is little doubt that the U.S.S.R. places more emphasis upon civil defense than the U.S. and that it may be somewhat better prepared than the U.S. in the event of a nuclear war. Yet, I believe that it is quite something else to claim that the civil defense program of the U.S.S.R. is so effective that it could deny the U.S. an adequate nuclear deterrent toward the U.S.S.R. or that the U.S. should emulate the Soviet Union's program. It is worth noting that the U.S.S.R. has traditionally placed much greater emphasis upon defensive measures than the U.S. In particular, the U.S.S.R. has spent enormous sums on strategic air defenses while the U.S. has all but phased out its own defense system. In spite of the Soviet's large and expensive air defense system, U.S. officials are quite confident that the U.S. bomber force could easily penetrate this system and reach its targets. Furthermore, no one has suggested that the U.S. duplicate the Soviet practice for air defense. I believe that the same should be true for the Soviet civil defense capability.

Concerning the various aspects of the Soviet civil defense program there are further questions. Great attention has been paid to Soviet plans for evacuation. I would question how effective such evacuation would be in a real nuclear conflict. To my knowledge the U.S.S.R. has never conducted any evacuation exercise on the scale of a large city. I also understand that there has been a renewed emphasis in recent years in the U.S.S.R. on urban shelters similar to those of the U.S. The effectiveness of Soviet evacuation would also appear to be dependent upon the maintenance of adequate food, medical and sanitary systems as well as adequate shelter and dispersal in order to gain protection from the delayed effects of nuclear fallout. Finally, it is not clear to me why Soviet evacuation plans could not be easily compensated for by certain changes in U.S. strategic targeting and warhead selections.

The question of Soviet civil defense and its implications for the U.S. deterrent is an important one which deserves critical analysis. If Congress finds these issues of further concern it should seek an independent analysis of the facts and arguments in this debate. An appropriate forum might be an ad hoc panel of experts in the strategic weapons and arms control fields under the guidance of the Office of Technology Assessment which could be commissioned to review a specific up-to-date report on Soviet civil defense capabilities, prepared at the request of Congress by appropriate agencies of the executive branch.

III. CONCERNS OVER U.S. CIVIL DEFENSE PROGRAMS

I believe that the United States should continue to maintain a modest, low-profile civil defense program as it has in the past. The civil defense program has suffered in the past from public and congressional inattention and I am glad that your committee and others in Congress have found a new interest in this subject. While I support the general concept of civil defense, I would suggest that it would be useful to have a thorough review of the priorities and programs of the Defense Civil Preparedness Agency and other agencies involved in civil defense. It might be useful to have the General Accounting Office examine the utilization of resources in these agencies; the readiness and availability of stockpiled items; and the necessity of a continuing shelter-space program. I would also like to express my disagreement with the recent administration decision to limit Federal funds to State and local governments to planning for only nuclear disasters rather than the dual-use concept which would allow funds for natural or nuclear disasters. I believe that this was a beneficial aspect of the previous program and that the dual-use concept should be reinstituted.

In a larger sense I am also concerned with how the U.S. civil defense program is managed and how it relates to the American people. Many Americans remember the alarm that the debate over civil defense created during the early 1960's. I am concerned that a U.S. evacuation or relocation program might result in a similar needless arousal of public passions. It may not be possible for the American people to give their wholehearted support to a large-scale civil defense program and seek meaningful arms limitation agreements and détente at the same time. I share the concern expressed by Gerard C. Smith, my successor as ACDA director and the former head of the SALT I negotiating team, that a major new civil defense program could lead to domestic pressures for deploying the next logical step—active defense or an ABM system. This would require abrogation of the present United States-U.S.S.R. ABM Treaty which I believe is one of the few meaningful arms limitation agreements which exists today.

In closing, I believe that the best means for protecting the American people from the effects of nuclear war is to prevent it from occurring in the first place and that this is best accomplished by a reinvigorated effort to negotiate meaningful arms reductions and limitations as well as a strong commitment to a policy of nuclear deterrence rather than the adoption of a concept of limited nuclear war, or the addition of new civil defense programs.

APPENDIX III

U.S. CIVILIAN NUCLEAR FATALITY ESTIMATES: FOR VARIOUS COUNTERFORCE ATTACK SCENARIOS

Type of attack:	Assumptions	Estimated fatalities
Comprehensive attack:		
Case 1, 60 percent destruction of military targets.	1 optimum height of burst and 1 surface burst warhead per each of 1,054 ICBM silos; pattern attack of SAC bases; unspecified attack on 2 SSBM support bases; good shelter posture.	3,200,000
Case 2, 60 percent destruction of military targets.	2 optimum height of burst warheads per each of 1,054 ICBM silos; no pattern attack of SAC bases; unspecified attack on 2 SSBM support bases; poor shelter posture.	6,700,000
Case 3, 57-60 percent destruction of military targets.	2 surface burst warheads per each of 1,054 ICBM silos; pattern attack of SAC bases; unspecified attack on 2 SSBM support bases; very poor shelter posture.	16,300,000
ICBM only attack:		
Case 1.....	2 550 kt optimum height of burst warheads per each of 1,054 ICBM silos.	4,000,000
Case 2, 42 percent silo destruction.	1 550 kt surface burst and 1 550 kt optimum height of burst warhead per each of 1,054 ICBM silos.	5,600,000
Case 3, 80 percent silo destruction.	1 3 Mt surface burst and 1 3 Mt optimum height of burst warhead per each of 1,054 ICBM silos.	18,300,000
Case 4.....	2 3 Mt surface burst warheads per each of 1,054 ICBM silos.	20,000,000
Airlift attack:¹		
Case 1.....	1 200 kt cruise missile warhead per each of 5 U.S. heavy airlift bases (Dover AFB, Del.; McGuire AFB, N.J.; Travis AFB, Calif.; Charleston AFB, S.C.; and McChord AFB, Wash.)	70,000
Case 2.....	1 12 Mt SLBM per each of 5 U.S. heavy airlift bases.	210,000
Case 3.....	1 12 Mt SLBM per each of 5 U.S. heavy airlift bases uses offset targeting.	135,000

¹ Department of Defense estimates as reported to the Senate Foreign Relations Committee, July 11, 1975, and published in "Analyses of Effects of Limited Nuclear War," pp. 12-24. Note that figures are fatalities only and not casualties and that attacks are restricted to military facilities (counterforce) rather than populated areas (countervalue). Shelter posture is a function of degree of hardening and the willingness of the population to use shelters.

² Under.

³ Circa.

⁴ Assumes allied victories in a European war supported by U.S. military airlift provide incentives for destruction of major American airlift centers.